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VOLUME II

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VERIFICATION OF PRODUCTION HOLE QUALITY

METCUT RESEARCH ASSOCIATES INC.
CINCINNATI, OH 45209

NOVEMBER 1977

TECHNICAL REPORT AFML-TR-77-185
FINAL REPORT AUGUST 1975-SEPTEMBER 1977

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AIR FORCE MATERIALS LABORATORY
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AIR FORCE SYSTEMS COMMAND
WRIGHT-PATTERSON AIR FORCE BASE, OHIO 45433

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This final report was submitted by Metcut Research Associates Inc., Cincinnati, Ohio, under Contract No. F33615-75-C-5173, Manufacturing Methods Project 760-5, "Verification of Production Hole Quality". Mr. William A. Harris, AFML/LTM, was the laboratory monitor.

This technical report has been reviewed and is approved for publication.

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Project Engineer

FOR THE COMMANDER

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Chief, Metals Branch
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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Definitive surface integrity information identifying and ranking the importance of hole quality variables on the performance of tapered interference fit fasteners has been developed. This report summarizes the fatigue behavior of open hole specimens and low load transfer specimens containing a variety of metallurgical and geometric hole quality variables. Limited crack growth behavior is also reported.

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FOREWORD

This final technical report covers all work performed under Contract F33615-75-C-5173 entitled "Verification of Production Hole Quality". This project was accomplished under the technical direction of W.A. Harris of the Metals Branch (LTM), Manufacturing Technology Division, Air Force Materials Laboratory, Wright-Patterson Air Force Base, Ohio. The effort was performed during the period 1 August 1975 through 31 July 1977 and was released by the authors in September 1977. The effort dealt with the quality requirements for an interference fit tapered fastener system, and was oriented toward a specific application within the C-5A aircraft program. The material and fastener design selected were chosen because that combination was one considered for extensive use in future wing structure developments of the C-5A aircraft.

The subject contract was placed with Metcut Research Associates Inc. of Cincinnati, Ohio. Metcut chose as its principal subcontractor the Lockheed-Georgia Company of Marietta, Georgia. Metcut provided the overall technical direction of the program as well as the facilities for manufacturing all test specimens and performing all of the fatigue tests reported herein. The Lockheed-Georgia Company provided engineering direction and support for the analysis of the data which resulted from the effort.

At Metcut, the program was under the supervision of Dr. William P. Koster. John B. Kohls, Dr. John T. Cammett and L.R. Gatto also contributed to the effort. Activities at the Lockheed-Georgia Company were managed by C.G. Trevillion and supported by H.S. Gibson, B.L. Cornell and P.G. Dodd who performed much of the detailed numerical analysis.

This program was a continuation of the effort in the surface integrity/surface quality area which has been supported by the Air Force Materials Laboratory for the past eight years to provide information which will lead to the cost effective manufacturing of aerospace hardware by the American industrial sector.

The final technical report on this contract is being prepared in two volumes. Volume I is the final summary report on all work performed including the necessary tables to document the procedures and the results obtained. Volume II contains the complete inspection reports on all specimens manufactured under this contract.

TABLE OF CONTENTS

INTRODUCTION

Under the performance of Contract No. F33615-75-C-5173 entitled "Verification of Production Hole Quality", something in excess of 360 aluminum panel fatigue specimens were prepared. These included specimens for evaluating the parent metal fatigue strength of the material, open hole specimens and low load transfer specimens of both dogbone/strap and reverse dogbone design.

All of these specimens, with the exception of the parent metal group, contained two tapered holes. For each specimen, a detailed inspection sheet or manufacturing report was prepared. This document identified the specific parameters used to finish the test holes. In addition, these sheets contain an inspection report summarizing the measured characteristics of both holes in the same specimen. Data includes surface finish, fastener protrusion (a measure of interference), perpendicularity, flushness, capacitance gage reading and a compilation of the air gage measurements taken on each hole. The results of a standard bluing pin test and the percentage of bearing indicated by this test are also included in these sheets.

This volume, an appendix to the main technical report, contains copies of the manufacturing reports for all of the specimens produced in this program which contained tapered holes. They are placed in order of test series as indicated in the Table of Contents. This information is being provided to permit further detailed study and analysis and interpretation of the data presented in the accompanying technical report.

INSPECTION SHEETS FOR BASELINE

EFFECTS OF HOLE QUALITY

Test Series ______ Quality Variable *BASE LINE - S/N CURVE*

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm *325* Feed: *HAND - 0.5 IPM*
Cutting Fluid: *STODDARD SOLVENT* Depth: (Ind. Reading) *1.953*

Results: Specimen No. *5B2B* Hole #1

Surface Finish, AA *35 - [illegible] μ in.*
Protrusion, in. *.198*
Perpendicularity, .001 in./gage length
Longitudinal *000* Transverse *.002/INCH*
Flush Gage Reading, in. *.002*
Capacitance Gage Reading: *400 AFTER BLUING*
Exit Burr Height, in. *.02[illegible]*

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	+ 1	+ 1	+ 1.5	+ 1	+ 1.5	+ 2	+ 2.5	2
#2	+ 1	+ 1	+ 0.5	+ 1	+ 2	+ 3	+ [illegible]	[illegible]
#3	0	+ 1.5	+ 2	+ 2	+ 2.5	+ 2.5	+ 1.5	[illegible]
#4	2.5	+ 3	+ 2	+ 3	+ 3	+ [illegible]	+ 2	2
#5	+ 3	+ 4	+ 3	+ 3	+ 2	+ 2.5	+ 1	2

Hole #2

Surface Finish, AA *40 - 65 μ in.*
Protrusion, in. *.188*
Perpendicularity, .001 in./gage length
Longitudinal *002/INCH* Transverse *003/INCH*
Flush Gage Reading, in. *.004*
Capacitance Gage Reading: *450 AFTER BLUING*
Exit Burr Height, in. *.010*

Bluing Pin Rollout

90%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	+ 1	[illegible]	+ 0.5	0	+ 1	0	+ 1.5	+ 1
#2	+ 1	[illegible]	+ 1	+ 1	+ 1	+ 0.5	+ 1	+ 1
#3	0	0	+ 1.5	1.5	+ 1	+ 0.5	[illegible]	0
#4	+ 1	+ 1.5	+ 2	+ 2	+ 1.5	[illegible]	+ 1.5	+ 2
#5	+ 1	[illegible]	+ [illegible]	+ 2	+ 1.5	2	+ 2	+ 2.5

EFFECTS OF HOLE QUALITY

Test Series ______ Quality Variable BASE LINE - S/N CURVE

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: [illegible] - 2.5 IPM
Cutting Fluid: [illegible] Depth: (Ind. Reading) 1.953

Results: Specimen No. 5A [illegible] Hole #1 [illegible]

Surface Finish, AA 50-60 [illegible]
Protrusion, in. .012
Perpendicularity, .001 in./gage length
Longitudinal [illegible] Transverse .002/[illegible]
Flush Gage Reading, in. .003
Capacitance Gage Reading: 330
Exit Burr Height, in. .015

Bluing Pin Rollout

65%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	+2	+2	+3	+[illegible]	+3.5	+3	+2	+0.5
#2	+1	+2	+3	+3	+1.5	+1.5	+1	+1
#3	0	-2.5	-1	+0.5	+1	0	-1	-0.5
#4	+1	+1.5	+1	+2.5	+[illegible]	+1.5	0	+1
#5	+7	[illegible]6.5	+8	+5.[illegible]	+5.[illegible]	+6.5	[illegible]	+5

Hole #2

Surface Finish, AA 45-55 [illegible]
Protrusion, in. [illegible]
Perpendicularity, .001 in./gage length
Longitudinal [illegible] Transverse [illegible]
Flush Gage Reading, in. [illegible]
Capacitance Gage Reading: 327
Exit Burr Height, in. .016

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	+1.5	+1	+1.5	+1.5	+2.5	+3	+2.5	+2.5
#2	+1.5	+1	+1	+1	+2	+2	+[illegible]	+3
#3	0	+0.5	+0.5	+2	+2	+1	-1	-0.5
#4	-0.5	+1	+2	+2	+3	+2	+1	+1
#5	+4.5	+6	[illegible]	+9	+9	+5.5	+7	+6

EFFECTS OF HOLE QUALITY

Test Series ______ Quality Variable Base Line - S/N Curve

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm [illegible] Feed: [illegible]
Cutting Fluid: Stoddard Solvent Depth: (Ind. Reading) 1.253

Results: Specimen No. 6AG[illegible] Hole #1 (MARKED END)

Surface Finish, AA 50-65[illegible] Bluing Pin Rollout
Protrusion, in. .176
Perpendicularity, .001 in./gage length
Longitudinal [illegible] Transverse [illegible]
Flush Gage Reading, in. [illegible]
Capacitance Gage Reading: 245 70%
Exit Burr Height, in. .015

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	+1	+1	+1	+2	+1.5	[illegible]	[illegible]	[illegible]
#2	+1	+1	+1	+2	+2	+4	[illegible]	[illegible]
#3	+[illegible]	+2.5	+1	+[illegible]	+2	1	+0.5	+[illegible]
#4	+2	+2.5	+1	+1.5	+[illegible]	+2	+2.5	+2
#5	+12	+[illegible]	+10	+10	+10	+10	1	+11

Hole #2

Surface Finish, AA 45-65 [illegible] in Bluing Pin Rollout
Protrusion, in. .162
Perpendicularity, .001 in./gage length
Longitudinal .006/inch Transverse [illegible]/inch
Flush Gage Reading, in. .001
Capacitance Gage Reading: 305
Exit Burr Height, in. .016

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	+2.5	+3.5	+4	+4	+3	+3	+2	+3
#2	+2.5	+4	+5	+4	+3	+2.5	+2	+2.5
#3	+2.5	+2	2.5	+4	+[illegible]	+1.5	+2	+2
#4	+5	+4.5	4	+1.5	+1.5	+[illegible]	4	+4
#5	+11.5	+12	+12	+11.5	+11.5	+12	+11.5	+11.5

EFFECTS OF HOLE QUALITY

Test Series ______ Quality Variable BASE LINE - S/N CURVE

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND-0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.953

Results: Specimen No. 2A4B. Hole #1 (MARKED END)

Surface Finish, AA 55-63 μ in.
Protrusion, in. .182
Perpendicularity, .001 in./gage length
Longitudinal .001/inch Transverse .002/INCH
Flush Gage Reading, in. .002
Capacitance Gage Reading: 330
Exit Burr Height, in. .016

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	+3	+2	+1.5	+1	+1.5	+2.5	+3.5	+3
#2	+2.5	+1.5	+1.5	+1	+1.5	+2	+4.5	+3.5
#3	+2.5	+1.5	+1	+1	+1.5	+1	0	+2
#4	+4.5	+3.5	+2	+1.5	+1	+2	+4	+5
#5	+11	+11	+11	+11	+10	+11	+11	+11

Hole #2

Surface Finish, AA 40-50 μ in.
Protrusion, in. .179
Perpendicularity, .001 in./gage length
Longitudinal .002/inch Transverse .005/INCH
Flush Gage Reading, in. .004
Capacitance Gage Reading: 364
Exit Burr Height, in. .016

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	+2	+2	+2	+2.5	+1.5	+1	+1	+2
#2	+1.5	+2	+3	+3.5	+1.5	+1	+1	+1.5
#3	+1	0	-1	+0.5	0	0	-0.5	+1
#4	+3	+3	+2	+2	0	+0.5	+1.5	+3
#5	+8	+8	+7	+7.5	+4	+6	+6	+8

EFFECTS OF HOLE QUALITY

Test Series ______ Quality Variable BASE LINE — S/N CURVE

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.953

Results: Specimen No. 5E5B Hole #1

Surface Finish, AA 58-65 μ in
Protrusion, in. .187
Perpendicularity, .001 in./gage length
Longitudinal .004/INCH Transverse .009/INCH
Flush Gage Reading, in. .003
Capacitance Gage Reading: 410
Exit Burr Height, in. .020

Bluing Pin Rollout

80%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	0	+ 1.5	+ 0.5	+ 1.5	0	+ 1	0	+ 1
#2	0	+ 1.5	+ 0.5	+ 1.5	0	+ 1	0	+ 1
#3	0	0	0	0	0	+ 1	0	+ 0.5
#4	+ 1.5	+ 1.5	+ 1	+ 1.5	0	+ 1	+ 0.5	+ 1.5
#5	+ 5	+ 5	+ 5	+ 4.5	+ 3	+ 2	+ 3	+ 3.5

Hole #2

Surface Finish, AA 32-40 μ in
Protrusion, in. .187
Perpendicularity, .001 in./gage length
Longitudinal .007/INCH Transverse .007/INCH
Flush Gage Reading, in. .003
Capacitance Gage Reading: 361
Exit Burr Height, in. .005

Bluing Pin Rollout

65%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	+ 0.5	0	0	+ 1	0	+ 1.5	+ 1	+ 2.5
#2	+ 1	+ 1	+ 1.5	+ 1.5	+ 1	+ 1.5	+ 2	+ 2.5
#3	0	- 0.5	+ 0.5	- 0.5	0	- 0.5	0	0
#4	+ 3.5	+ 2	+ 2	+ 0.5	+ 1	+ 1	+ 3	+ 2.5
#5	+ 8.5	+ 9	+ 8	+ 11	+ 7	+ 7.5	+ 8	+ 7.5

EFFECTS OF HOLE QUALITY

Test Series ______ Quality Variable BASE LINE - [illegible]

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group I, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND - 2.5 IPM
Cutting Fluid: STANDARD SOLVENT Depth: (Ind. Reading) 1.953

Results: Specimen No. 5C5B Hole #1 (MARKED [illegible])

Surface Finish, AA 35-46 μ in.
Protrusion, in. .187
Perpendicularity, .001 in./gage length
Longitudinal .003/in. Transverse .004/inch
Flush Gage Reading, in. .004
Capacitance Gage Reading: 332
Exit Burr Height, in. .012

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	Angular Position							
	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	+2	-2	0	+1	+1.5	+[illegible]	+4	+2
#2	+2	+1	0	+1	+1.5	+[illegible]	+4.5	+4.5
#3	+2	+2	+1	-1.5	+1	+2	+2	+1.5
#4	+4.5	+4	+2.5	+1.5	+2.[illegible]	+0.5	+2	+4.5
#5	+11	+11	+10	+12	+9	+10	+10.5	+11

Hole #2

Surface Finish, AA 40-50 μ in.
Protrusion, in. .175
Perpendicularity, .001 in./gage length
Longitudinal [illegible] Transverse [illegible]
Flush Gage Reading, in. [illegible]
Capacitance Gage Reading: 2[illegible]2
Exit Burr Height, in. .076

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	Angular Position							
	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	+3	+5	+3.5	+4	+3	+[illegible]	+3	+[illegible]
#2	+2.5	+7	+4	+3.5	+3	+3	+2	[illegible]
#3	+4	+4	+3	+1.5	+2	+2	+2	[illegible]
#4	+6	+5.5	+5	+1	+1.5	+1	+3.5	[illegible]
#5	+12	+12	+12	+12	+12	+12	+12	+13.5

EFFECTS OF HOLE QUALITY

Test Series ______ Quality Variable BASE LINE - S/N CURVE

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.953

Results: Specimen No. 2023 Hole #1 (MARKED END)

Surface Finish, AA 50-62 μ in.
Protrusion, in. .187
Perpendicularity, .001 in./gage length
Longitudinal .002 INCH Transverse .008/INCH
Flush Gage Reading, in. .001
Capacitance Gage Reading: 278
Exit Burr Height, in. .014

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	+2.5	+2.5	+1	+3	+11	+5	+5.5	+4.5
#2	+2	+1	+1	+2	+4	+5	+[illegible]	-3.5
#3	+[illegible]	+2	+3	+2	+2.5	+[illegible]	-[illegible]	+4
#4	+7	+4	+4.5	+1	+[illegible].5	+5	+6.5	+7
#5	+12	+12	+12	+12	+12	+12	+12	+12

Hole #2

Surface Finish, AA 42-48 μ in.
Protrusion, in. .78
Perpendicularity, .001 in./gage length
Longitudinal .000 Transverse .002 in.
Flush Gage Reading, in. .001
Capacitance Gage Reading: 310
Exit Burr Height, in. .011

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	+2	+2	+2.5	+3	+2.5	+2	+1.5	+1
#2	+2	+3.5	+[illegible]	+4	+2.5	+2	+2	+1.5
#3	+2.5	+[illegible]	+0	+1	+1.5	+0.5	+1	+2
#4	+5	+5	+3	+2	+0.5	+1	+3	+4.5
#5	+11.5	+12	+11	+12	+11	+12	+11.5	+11.5

EFFECTS OF HOLE QUALITY

Test Series ______ Quality Variable Base Line – [illegible]

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND – 0.5 IPM
Cutting Fluid: STANDARD SOLVENT Depth: (Ind. Reading) 1.953

Results: Specimen No. 5E4L Hole #1 ([illegible])
Surface Finish, AA 50-63 [illegible]
Protrusion, in. .104
Perpendicularity, .001 in./gage length
Longitudinal .001 [illegible] Transverse .001 [illegible]
Flush Gage Reading, in. .004
Capacitance Gage Reading: 31 [illegible]
Exit Burr Height, in. .017

Bluing Pin Rollout

80%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	+ 2	+ 1.5	+ 1.5	+ 1.5	+ 2	[illegible]	+ 3	+ 3
#2	+ 2	+ 0	+ 2	[illegible]	+ 2	[illegible]	+ 4	+ 3.5
#3	+ 2	+ 1	+ 1	[illegible]	+ 1	[illegible]	+ 1	+ 2
#4	+ 4.5	+ 3	+ 2	+ 1.5	+ 1	+ 2.5	+ 4	+ 4.5
#5	+ 10.5	+ 10.5	+ 10.5	+ 12	+ 10	[illegible]	+ 11	+ 11

Hole #2

Surface Finish, AA 45-55 [illegible]
Protrusion, in. .124
Perpendicularity, .001 in./gage length
Longitudinal [illegible] Transverse [illegible]
Flush Gage Reading, in. [illegible]
Capacitance Gage Reading: 330
Exit Burr Height, in. .016

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	+ 1.5	+ 2.5	+ 2.5	+ 3	+ 1	+ 1.5	+ 1	+ 2
#2	+ 1.5	+ 2.5	+ 3	+ 2.5	+ 1	+ 0.5	+ 1	+ 1
#3	+ 3	+ 1	+ 1.5	+ 0.5	+ 1	+ 0.5	+ 2	+ 2
#4	+ 5	+ 4	+ 4	+ 1	+ 1	+ 0.5	+ 3.5	+ 4
#5	+ 11	+ 11.5	+ 11.5	+ 11	+ 11	+ 11	+ 11	+ 11

EFFECTS OF HOLE QUALITY

Test Series ______ Quality Variable *Base Line – S/N [illegible]*

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm *[illegible]* Feed: *HAND – [illegible]*
Cutting Fluid: *[illegible] SOLVENT* Depth: (Ind. Reading) *1.752*

Results: Specimen No. *5A67* Hole #1 *(MARKED END)*

Surface Finish, AA *25-32 [illegible]*
Protrusion, in. *.155*
Perpendicularity, .001 in./gage length
Longitudinal *.001/INCH* Transverse *.004/INCH*
Flush Gage Reading, in. *.002*
Capacitance Gage Reading. *354* *350 AFTER BLUING*
Exit Burr Height, in. *.010*

Bluing Pin Rollout

70°

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
	Angular Position							
Bottom #1	+2	+2	+2	+1	+1.5	+1.5	+2	+2
#2	+1	+2	+1.5	+1.5	+1.5	+2	+2	+2
#3	+2	+3	+2.5	+2.5	[illegible]	+1	+1	+2.5
#4	+4	+5	+3.5	+2.5	[illegible]	+1	+1	+3.5
#5	+9	+9.5	+9	+9	+5	+8	+9	+9.5

Hole #2

Surface Finish, AA *25-35 [illegible]*
Protrusion, in. *.133*
Perpendicularity, .001 in./gage length
Longitudinal *[illegible]* Transverse *.002/INCH*
Flush Gage Reading, in. *.004*
Capacitance Gage Reading: *356* *350 AFTER BLUING, 70°*
Exit Burr Height, in. *.012*

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
	Angular Position							
Bottom #1	+1.5	+1	+1	+1	+1.5	+1.5	+2	+2
#2	+1	+1	+1.5	+2	+2	+2	+1.5	+2
#3	+2.5	+2.5	+2	+1.5	+1	+1.5	+2	+2.5
#4	+3.5	+3	+2	+1.5	+0.5	+1.5	+2.5	+4
#5	+7	+7	+7	+7	[illegible]	+6	+6.5	+7

HOLE 1

70°

EFFECTS OF HOLE QUALITY

Test Series ______ Quality Variable BASE LINE – S/N CURVE

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm [illegible] Feed: [illegible]
Cutting Fluid: [illegible] Depth: (Ind. Reading) 1.952

Results: Specimen No. 5E [illegible] Hole #1
Surface Finish, AA 32 - 50 [illegible]
Protrusion, in. .183
Perpendicularity, .001 in./gage length
Longitudinal .003/INCH Transverse .003/INCH
Flush Gage Reading, in. .002
Capacitance Gage Reading: 344 [illegible]
Exit Burr Height, in. .015

Bluing Pin Rollout 70%

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	+ 2	+ 2.5	+ [illegible]	+ 2	+ 1	+ 2	+ 1	+ 2
#2	+ 1.5	+ 2.5	+	+ 2	+ 1	+ 1.5	+ 1	+ 2.5
#3	+ 1.5	+ 2.5	+ 1	+ [illegible]	+ 1	+ [illegible]	+ 1.5	+ 2.5
#4	+ 4	+ 4	+ 3	+ 2.5	+ 1	+ 1	+ 2	+ 3
#5	+ 9	+ 9	+ 3.5	+ 9	+ 7	+ 6.5	+ 7	+ 8

Hole #2

Surface Finish, AA 35 – 6 [illegible]
Protrusion, in. .178
Perpendicularity, .001 in./gage length
Longitudinal .003/INCH Transverse .003/INCH
Flush Gage Reading, in. .002
Capacitance Gage Reading: 355 [illegible]
Exit Burr Height, in. .014

Bluing Pin Rollout 70%

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	+ 2	+ 1.5	+ 1.5	+ 1.5	+ 1.5	+ 1.5	+ 2	+ 1.5
#2	+ 2	+ 2	+ 2	+ 2	+ 2	+ 2	+ 2	+ 1
#3	+ 2	+ 2	+ 2	+ 1.5	+ 1	+ 1	+ 1.5	+ 1
#4	+ 3.5	+ 2.5	+ 1.5	+ 1	+ 1	+ 2	+ 3	+ 2.5
#5	+ 8	+ 7	+ 5.5	+ 5	+ 5	+ 6	+ 11	+ 7

INSPECTION SHEETS FOR TEST SERIES 2 - INTERFERENCE

EFFECTS OF HOLE QUALITY

Test Series 2 Quality Variable INTERFERENCE (.0005)

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.953

Modify Good Holes Using Following Conditions:
Tool: GROUP 2 OMARK DRILL REAMER
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.500
Procedure: REAM GOOD HOLE, TOUCH UP WITH GROUP 2 REAMER WHILE NOT ROTATING, THEN REAM .162" DEEPER

Results: Specimen No. 4C2B Hole #1

Surface Finish, AA 18-25 μ in
Protrusion, in. .033
Perpendicularity, .001 in./gage length
Longitudinal .003/INCH Transverse .001/INCH
Flush Gage Reading, in. .000
Capacitance Gage Reading: 405

Bluing Pin Rollout

80%

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #2	+1	+1	0	0	0	0	0	+0.5
#3	0	+0.5	0	0	0	0	0	0
#4	0	0	0	+0.5	+1	+1	0	0
#5	0	0	0	+0.5	+1	+1	0	0
#6	0	1	0	0	+0.5	0	0	0
#7	+4	+5	+4	+4	+4.5	+4	+4	+4

Hole #2

Surface Finish, AA 35-45 μ in
Protrusion, in. .028
Perpendicularity, .001 in./gage length
Longitudinal 000 Transverse .003/INCH
Flush Gage Reading, in. .003
Capacitance Gage Reading: 420

Bluing Pin Rollout

80%

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #2	+0.5	0	0	0	0	0	0	0
#3	0	0	0	0	0	0	0	0
#4	0	0	0	+1	+1	+1	0	0
#5	0	0	0	+0.5	+1	+1	0	0
#6	0	0	0	0	0	0	0	0
#7	+3	+3	+3.5	+3.5	+3.5	+3.5	+3.5	+3.5

EFFECTS OF HOLE QUALITY

Test Series 2 Quality Variable INTERFERENCE (.0005)

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.953

Modify Good Holes Using Following Conditions:
Tool: GROUP 2 OMARK DRILL REAMER
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.506
Procedure: REAM GOOD HOLE, TOUCH UP WITH GROUP 2 REAMER WHILE NOT ROTATING, THEN REAM .162" DEEPER

Results: Specimen No. 5C1B Hole #1
Surface Finish, AA 40-50 μin
Protrusion, in. .015
Perpendicularity, .001 in./gage length
Longitudinal .003/INCH Transverse .003/INCH
Flush Gage Reading, in. .004
Capacitance Gage Reading: 545

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1 2	0	0	0	0	+0.5	0	0	0
#2 3	0	0	0	0	0	0	0	0
#3 4	0	0	0	0	0	0	0	0
#4 5	0	0	0	0	0	0	0	0
#5 6	0	0	0	0	0	0	0	0
#7	+1	+0.5	+0.5	+0.5	0	0	+0.5	+1

Hole #2

Surface Finish, AA 42-48 μin
Protrusion, in. .026
Perpendicularity, .001 in./gage length
Longitudinal .003/INCH Transverse .000
Flush Gage Reading, in. .004
Capacitance Gage Reading: 520

Bluing Pin Rollout

65%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1 2	0	0	0	0	0	0	0	0
#2 3	0	0	0	0	0	0	0	0
#3 4	0	0	0	0	0	0	0	0
#4 5	0	0	0	0	0	0	0	0
#5 6	0	0	0	0	0	0	0	0
#7	+1	+1	0	0	0	+1	+0.5	+1

EFFECTS OF HOLE QUALITY

Test Series 2 Quality Variable INTERFERENCE (.0005)

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.953

Modify Good Holes Using Following Conditions:
Tool: GROUP 2 OMARK DRILL REAMER
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading)
Procedure: REAM GOOD HOLE, TOUCH UP WITH GROUP 2 REAMER WHILE NOT ROTATING, THEN REAM .162" DEEPER

Results: Specimen No. 5B5CT Hole #1

Surface Finish, AA 28-34 μ in.
Protrusion, in. .028
Perpendicularity, .001 in./gage length
Longitudinal 000 Transverse .004/INCH
Flush Gage Reading, in. .002
Capacitance Gage Reading: 453

Bluing Pin Rollout

85%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #~~1~~ 2	+0.5	+1	+0.5	0	0	0	0	0
#~~2~~ 3	0	+0.5	0	0	0	0	0	0
#~~3~~ 4	0	0	0	0	0	0	0	0
#~~4~~ 5	0	0	0	0	0	0	0	0
#~~5~~ 6	+0.5	0	+0.5	0	0	0	0	0
#7	+4.5	+4.5	+4.5	+4.5	+4	+4	+4.5	+4

Hole #2

Surface Finish, AA 30-38 μ in.
Protrusion, in. .039
Perpendicularity, .001 in./gage length
Longitudinal 000 Transverse .004/INCH
Flush Gage Reading, in. .002
Capacitance Gage Reading: 453

Bluing Pin Rollout

80%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #~~1~~ 2	+0.5	0	0	0	0	0	+0.5	+0.5
#~~2~~ 3	0	0	0	0	0	0	+0.5	0
#~~3~~ 4	0	0	0	+0.5	+0.5	+0.5	+0.5	0
#~~4~~ 5	0	0	0	+0.5	+0.5	+1	0	0
#~~5~~ 6	+0.5	0	0	0	0	+0.5	0	+1
#7	+4.5	+4.5	+4.5	+4.5	+4.5	+5	+5	+5

EFFECTS OF HOLE QUALITY

Test Series 2 Quality Variable INTERFERENCE (.0005)

Produce Good Hole Using Following Conditions:

Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)

Spindle, rpm 325 Feed: HAND - 0.5 IPM

Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.953

Modify Good Holes Using Following Conditions:

Tool: GROUP 2 OMARK DRILL REAMER

Spindle, rpm 325 Feed: HAND - 0.5 IPM

Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.490

Procedure: REAM GOOD HOLE, TOUCH UP WITH GROUP 2 REAMER WHILE NOT ROTATING, THEN REAM .162" DEEPER

Results: Specimen No. 5A3CT

Hole #1

Surface Finish, AA 18-25 μ in

Protrusion, in. .026

Perpendicularity, .001 in./gage length

Longitudinal .001/INCH Transverse .003/INCH

Flush Gage Reading, in. .001

Capacitance Gage Reading: 395

Bluing Pin Rollout

90%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #2	0	+0.5	+0.5	0	0	0	0	0
#3	0	0	0	0	0	0	0	0
#4	0	0	0	0	0	+0.5	+0.5	0
#5	0	0	+0.5	0	0	0	0	0
#6	0	0	+0.5	0	0	0	0	0
#7	+4	+4	+4	+3.5	+4	+4	+4	+4

Hole #2

Surface Finish, AA 15-22 μ in

Protrusion, in. .022

Perpendicularity, .001 in./gage length

Longitudinal .001/INCH Transverse .001/INCH

Flush Gage Reading, in. .002

Capacitance Gage Reading: 420

Bluing Pin Rollout

80%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #2	0	+0.5	0	0	0	0	0	0
#3	0	0	0	0	0	0	0	0
#4	0	0	0	0	0	0	0.5	0
#5	0	0	0	0	0	0	0	0
#6	0	0	0	0	0	0	0	0
#7	+3	+3	+4	+4	+4	+3.5	+3	+3

EFFECTS OF HOLE QUALITY

Test Series 2 Quality Variable INTERFERENCE (.0005)

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading)

Modify Good Holes Using Following Conditions:
Tool: GROUP 2 OMARK DRILL REAMER
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading)
Procedure: REAM GOOD HOLE, TRIM UP WITH GROUP 2 REAMER WHILE NOT ROTATING, THEN REAM .162" DEEPER

Results: Specimen No. 5EGCB Hole #1
Surface Finish, AA 30-35 μin
Protrusion, in. .018
Perpendicularity, .001 in./gage length
Longitudinal 000 Transverse 001/INCH
Flush Gage Reading, in. .001
Capacitance Gage Reading: 388

Bluing Pin Rollout
70%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #2	+1	+1	+1.5	+1	+2	+1.5	+1.5	+1.5
#3	0	0	0	0	0	0	0	0
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0
#6	0	0	0	0	0	0	0	0
#7	+1	+0.5	+1	0	0	+0.5	0	+1

Hole #2
Surface Finish, AA 38-44 μ-in
Protrusion, in. .030
Perpendicularity, .001 in./gage length
Longitudinal .002/INCH Transverse .002/INCH
Flush Gage Reading, in. .001
Capacitance Gage Reading: 460

Bluing Pin Rollout
65%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #2	0	0	0	0	0	0	+0.5	0
#3	0	0	0	0	0	0	0	0
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0
#6	0	0	0	0	0	0	0	0
#7	+3	+3.5	+4	+4	+4	+4	+4	+4

EFFECTS OF HOLE QUALITY

Test Series 2 Quality Variable Interference (CC23)

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: Hand 0.5 IPM
Cutting Fluid: Standard Solvent Depth: (Ind. Reading) 1.954

Modify Good Holes Using Following Conditions:
Tool: Group 2 Carbide Drill Reamer
Spindle, rpm 325 Feed: Hand 0.5 IPM
Cutting Fluid: Standard Solvent Depth: (Ind. Reading) 1.400
Procedure: Ream good hole. Touch lip with Group 2 reamer while not rotating. Then ream .060" deeper

Results: Specimen No. 4E2P Hole #1
Surface Finish, AA 30-38 μin
Protrusion, in. .118
Perpendicularity, .001 in./gage length
Longitudinal .003/inch Transverse .001/inch
Flush Gage Reading, in. .000
Capacitance Gage Reading: 380

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
	Angular Position							
Bottom #1	0	0	0	0	0	0	+0.5	+0.5
#2	0	0	0	0	0	0	+1	+1
#3	+0.5	0	0	0	0	+1	+1	+1
#4	0	+0.5	+0.5	+1	1	+0.5	0	0
#5	+0.5	0	+0.5	0	0	0	+0.5	+0.5

Hole #2

Surface Finish, AA 32-40 μin
Protrusion, in. .125
Perpendicularity, .001 in./gage length
Longitudinal .000 Transverse .001/inch
Flush Gage Reading, in. .003
Capacitance Gage Reading: 414

Bluing Pin Rollout

65%

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
	Angular Position							
Bottom #1	+0.5	0	+0.5	0	0	+1	+0.5	+1
#2	0	0	0	0	0	0	0	+0.5
#3	0	+1	0	0	0	0	+1	+1
#4	0	0	+0.5	+0.5	+1	0	0	0
#5	0	0	+0.5	0	+0.5	0	+0.5	+1

EFFECTS OF HOLE QUALITY

Test Series 2 Quality Variable INTERFERENCE (CC23)

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.954

Modify Good Holes Using Following Conditions:
Tool: GROUP 2 OMARK DRILL-REAMER
Spindle, rpm 325 Feed: HAND 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.400
Procedure: REAM GOOD HOLE, TOUCH UP WITH GROUP 2 REAMER WHILE NOT ROTATING, THEN REAM .060" DEEPER

Results: Specimen No. 4A3T Hole #1
Surface Finish, AA 25-36 μin
Protrusion, in. .111
Perpendicularity, .001 in./gage length
Longitudinal .010/INCH Transverse .004/INCH
Flush Gage Reading, in. .002
Capacitance Gage Reading: 288

Bluing Pin Rollout

90%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	+0.5	+0.5	0	0	0	0	+0.5	+0.5
#2	0	0	0	0	0	0	+0.5	+0.5
#3	0	0	0	0	+0.5	+0.5	+0.5	+0.5
#4	0	0	+0.5	0	0	+0.5	0	0
#5	0	0	0	0	0	0	0	0

Hole #2

Surface Finish, AA 40-52 μin
Protrusion, in. .104
Perpendicularity, .001 in./gage length
Longitudinal .002/INCH Transverse .007/INCH
Flush Gage Reading, in. .000
Capacitance Gage Reading: 417

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	+1	+1	0	0	0	+0.5	+1	+1
#2	+0.5	+0.5	0	0	0	0	+0.5	+0.5
#3	0	0	0	0	0	0	0	0
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0

EFFECTS OF HOLE QUALITY

Test Series 2 Quality Variable INTERFERENCE (CC23)

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND-0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.954

Modify Good Holes Using Following Conditions:
Tool: GROUP 2 OMARK DRILL-REAMER
Spindle, rpm 325 Feed: HAND-0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.400
Procedure: REAM GOOD HOLE, TOUCH UP WITH GROUP 2 REAMER WHILE NOT ROTATING, THEN REAM .080" DEEPER

Results: Specimen No. 4D4B Hole #1
Surface Finish, AA 20-30 μin
Protrusion, in. .116
Perpendicularity, .001 in./gage length
Longitudinal .004/INCH Transverse .006/INCH
Flush Gage Reading, in. .004
Capacitance Gage Reading: 380

Bluing Pin Rollout

90%

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	+0.5	+0.5	0	0	0	0	0	0
#2	+0.5	+0.5	0.5	0	0	0	0	0
#3	0	+0.5	0.5	0	0	0	0	0
#4	0	0	0	0	0	+1	0	0
#5	+0.5	+0.5	0	0	0	0	0	0

Hole #2
Surface Finish, AA 38-44 μin
Protrusion, in. 108
Perpendicularity, .001 in./gage length
Longitudinal .001/INCH Transverse .002/INCH
Flush Gage Reading, in. 003
Capacitance Gage Reading: 379

Bluing Pin Rollout

90%

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	+0.5	0	0	0	0	0	0	0
#2	0	0	+1	0	0	0	0	0
#3	0	+0.5	+1	+1	0	0	0	0
#4	0	0	0	0	0	+1	+1	+0.5
#5	+0.5	0	0	0	0	+0.5	0	0

EFFECTS OF HOLE QUALITY

Test Series 2 Quality Variable INTERFERENCE (.0023)

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.954

Modify Good Holes Using Following Conditions:
Tool: GROUP 2 OMARK DRILL-REAMER
Spindle, rpm 325 Feed: HAND 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.400
Procedure: REAM GOOD HOLE, TOUCH UP WITH GROUP 2 REAMER WHILE NOT ROTATING, THEN REAM .080" DEEPER

Results: Specimen No. 5C1T Hole #1
Surface Finish, AA 10-40 μ in
Protrusion, in. .112
Perpendicularity, .001 in./gage length
Longitudinal .003/INCH Transverse .002/INCH
Flush Gage Reading, in. .002
Capacitance Gage Reading: 370

Bluing Pin Rollout

80%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	+0.5	+1	0	+0.5	0	0	+0.5	+1
#2	+0.5	+0.5	0	+0.5	+0.5	+1	+0.5	+1
#3	0	0	0	+1	+1	+1	+0.5	0
#4	0	0	0	+1	+1	+0.5	0	0
#5	0	+0.5	0.5	+0.5	0	0	0	+0.5

Hole #2

Surface Finish, AA 30-45 μ in
Protrusion, in. .115
Perpendicularity, .001 in./gage length
Longitudinal .006/INCH Transverse .007/INCH
Flush Gage Reading, in. .002
Capacitance Gage Reading: 422

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	+0.5	0	0	0	0	0	0	0
#2	+0.5	0	+0.5	0	0	0	0	0
#3	0	0	+0.5	0	+0.5	0	0	0
#4	0	0	0	0	+0.5	+0.5	0	0
#5	+0.5	0	0	0	0	0	+0.5	+0.5

EFFECTS OF HOLE QUALITY

Test Series 2 Quality Variable INTERFERENCE (.0023)

Produce Good Hole Using Following Conditions:

Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)

Spindle, rpm 325 Feed: HAND C.S IPM

Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.954

Modify Good Holes Using Following Conditions:

Tool: GROUP 2 OMARK DRILL-REAMER

Spindle, rpm 325 Feed: HAND C.S IPM

Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.400

Procedure: REAM GOOD HOLE, TOUCH UP WITH GROUP 2 REAMER WHILE NOT ROTATING, THEN REAM .060" DEEPER

Results: Specimen No. 3B1T Hole #1

Surface Finish, AA 28-34 μin

Protrusion, in. .123

Perpendicularity, .001 in./gage length

Longitudinal .003/INCH Transverse .010/INCH

Flush Gage Reading, in. .001

Capacitance Gage Reading: 505

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
	Angular Position							
Bottom #1	0	0	0	0	0	0	0	0
#2	0	+0.5	0	0	0	0	0	0
#3	0	0	0	0	0	0	0	0
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0

Hole #2

Surface Finish, AA 35-44 μin

Protrusion, in. .112

Perpendicularity, .001 in./gage length

Longitudinal .009/INCH Transverse .005/INCH

Flush Gage Reading, in. .003

Capacitance Gage Reading: 560

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
	Angular Position							
Bottom #1	0	0	0	0	0	0	0	0
#2	0	0	0	0	0	0	0	0
#3	0	0	0	0	0	0	0	0
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0

EFFECTS OF HOLE QUALITY

Test Series 2 Quality Variable INTERFERENCE (.0035)

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 17/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: [illegible]
Cutting Fluid: [illegible] Depth: (Ind. Reading) 1.953

Results: Specimen No. 4A4.6 Hole #1 [illegible]

Surface Finish, AA 45-55μ in.
Protrusion, in. .180
Perpendicularity, .001 in./gage length
Longitudinal .005/inch Transverse .000/inch
Flush Gage Reading, in. .005
Capacitance Gage Reading: 330
Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
	Angular Position							
Bottom #1	+2.5	+1.5	+1	+1.5	+2	+2	+2.5	+2
#2	+1	+1	+0.5	+1.5	+1.5	+2	+1.5	+2
#3	+2	+2	1	+2	+1.5	+1	+2	+1.5
#4	+3.5	+3.5	2.5	+2	0.5	+1	+1.5	+3
#5	+10	+10	9.5	9.5	[illegible]	+9	9	+9.5

Hole #2

Surface Finish, AA 35-45μ in.
Protrusion, in. .185
Perpendicularity, .001 in./gage length
Longitudinal .004/inch Transverse .005 in.
Flush Gage Reading, in. [illegible]
Capacitance Gage Reading: 325
Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
	Angular Position							
Bottom #1	1	+1	2	+1	+1	0	0	0
#2	1.5	+1.5	3	+2	+1.5	0	+0.5	0
#3	1	0	3	-1	+1	0	0	0
#4	2.5	+2.5	2	+1	+1.5	+1	1.5	+2
#5	6	+7	7	+6.5	+6	6	+7	7.5

EFFECTS OF HOLE QUALITY

Test Series 2 Quality Variable INTERFERENCE (.0035)

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND [illegible]
Cutting Fluid: [illegible] Depth: (Ind. Reading) 1.955

Results: Specimen No. 5C4 [illegible] Hole #1 [illegible]

Surface Finish, AA 30-40 [illegible]
Protrusion, in. .15[illegible]
Perpendicularity, .001 in./gage length
Longitudinal 003 Transverse [illegible]
Flush Gage Reading, in. [illegible]
Capacitance Gage Reading: [illegible]
Exit Burr Height, in. [illegible]

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	+ 1	[illegible]	+ 1	+ [illegible]	+ 1	+ [illegible]	[illegible]	[illegible]
#2	+ 1.5	[illegible]	+ 2	+ [illegible]	+ 2	[illegible]	[illegible]	[illegible]
#3	+ 2	[illegible]	2.[illegible]	2.5	+ 2	[illegible]	[illegible]	[illegible]
#4	+ 3	1.5	[illegible]	[illegible]	+ 1	[illegible]	[illegible]	+ 1.5
#5	+ 6.5	- 6	+ [illegible]	+ 5	+ 4.5	+ 5	[illegible]	+ 5.5

Hole #2

Surface Finish, AA 28-35 [illegible]
Protrusion, in. .156
Perpendicularity, .001 in./gage length
Longitudinal [illegible] Transverse 002
Flush Gage Reading, in. .004
Capacitance Gage Reading: 349
Exit Burr Height, in. [illegible]

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	+ 2	+ 2	+ 3	+ 2.5	+ 2	+ 1	+ 1.5	+ [illegible]
#2	+ 2	+ 2.5	+ 4	+ 3	+ 2.5	+ 1.5	+ [illegible]	[illegible]
#3	+ 2.5	+ 1.5	+ 1	+ 2	+ 1	+ 1.5	+ 2	[illegible]
#4	+ 4.5	+ 3.5	+ 2	+ 1.5	+ 0.5	+ 1.5	+ 2.5	[illegible]
#5	+ 9	+ 7.5	+ 9	+ 5.5	+ 7.5	+ 5	+ 8.5	+ [illegible]

EFFECTS OF HOLE QUALITY

Test Series 2 Quality Variable INTERFERENCE (.0035)

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm [illegible] Feed: HAND - 2.5 IPM
Cutting Fluid: [illegible] Depth: (Ind. Reading) 1.953

Results: Specimen No. 5C5CB Hole #1 (MARKED END)
Surface Finish, AA 50-60 μ in.
Protrusion, in. .152
Perpendicularity, .001 in./gage length
Longitudinal .002/inch Transverse .001/INCH
Flush Gage Reading, in. .001
Capacitance Gage Reading: 330
Exit Burr Height, in. .017

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	+ 2	+ 2	[illegible]	+ 1	+ [illegible]	+ 3	+ [illegible]	+ [illegible]
#2	+ 2	+ 2	+ [illegible]	+ 1	+ 2.5	+ 3	+ [illegible]	+ [illegible]
#3	+ 2	+ 1	+ 2.5	+ 1	+ 1	+ 0.5	+ [illegible]	+ [illegible]
#4	+ 3	+ 2	+ 1	+ 1.5	+ 0.5	+ 1	+ 1.5	+ [illegible]
#5	+ 7	+ 6	+ 6	+ [illegible]	+ [illegible]	+ 5.5	+ 6	+ 7.5

Hole #2

Surface Finish, AA 30-40 μ in.
Protrusion, in. .162
Perpendicularity, .001 in./gage length
Longitudinal .002/inch Transverse [illegible]/inch
Flush Gage Reading, in. .004
Capacitance Gage Reading: 310
Exit Burr Height, in. .017

Bluing Pin Rollout

60%

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	+ 3	+ 2.5	+ 3	+ [illegible]	+ 2.5	+ 3	+ 3	+ 3.5
#2	+ 2.5	+ 2	+ 3	+ 2.5	+ 2.5	+ 2.5	+ 3	+ 2.5
#3	+ 3	+ 1	+ 2	+ 2.5	+ 1.5	+ 1	+ 2.5	+ 2
#4	+ 5	+ 3	+ 2	0	+ 1.5	+ 2	+ 5	+ [illegible]
#5	+ 10.5	+ 10	+ 10.5	+ [illegible]	+ 10	+ 10	+ 10.5	+ 10

EFFECTS OF HOLE QUALITY

Test Series 2 Quality Variable INTERFERENCE (.0035)

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.952

Results: Specimen No. 6AGT Hole #1 (MARKED END)

Surface Finish, AA 50-60 μ in
Protrusion, in. .182
Perpendicularity, .001 in./gage length
Longitudinal .000 Transverse .000
Flush Gage Reading, in. .004
Capacitance Gage Reading: 300
Exit Burr Height, in. .016

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	+2.5	0.5	+2	+2.5	+2.5	+3	+4	+3
#2	+2.5	0.5	+2.5	+2	+3.5	+4	+5	+3
#3	+2.5	2	+2.5	+1	+2	+0.5	+2.5	+2
#4	+3	3.5	+2.5	0	+1	0	+3	+3
#5	+11.5	11.5	+11.5	+11.5	+11.5	+11.5	+11.5	+11.5

Hole #2

Surface Finish, AA 45-55 μ in.
Protrusion, in. .197
Perpendicularity, .001 in./gage length
Longitudinal .001/in. Transverse .004/in.
Flush Gage Reading, in. .004
Capacitance Gage Reading: 332
Exit Burr Height, in. .013

Bluing Pin Rollout

70°

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	+2.5	+2	+1	0	+2.5	+1	+2.5	+2
#2	+2	+2	+2	+1.5	+1	+1	+1.5	+2
#3	+2.5	+1	+1	+1	+1	+2.5	+1	+1.5
#4	+5	+3.5	+3	+1.5	+1	+2.5	+2	+3.5
#5	+11	+10.5	+10	+10	+12	+9	+9.5	+10

EFFECTS OF HOLE QUALITY

Test Series 2 Quality Variable INTERFERENCE (.0035)

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed:
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading)

Results: Specimen No. 5C6T Hole #1 ([illegible] E[illegible])
Surface Finish, AA 58-65 μ in. Bluing Pin Rollout
Protrusion, in. .193
Perpendicularity, .001 in./gage length
Longitudinal [illegible]/INCH Transverse [illegible]/INCH
Flush Gage Reading, in. .004
Capacitance Gage Reading: 364
EXIT BURR HEIGHT, IN. .016

7[illegible]

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	0	+ 2	+ 1	+ 2	+ 1.5	+ 2.5	+ 2	+ 2
#2	0	+ 2	+ 1.5	+ 2	+ 1.5	+ [illegible]	+ 2	+ 2.5
#3	-0.5	+ 1.5	0	+ 2	+ 1	+ [illegible]	[illegible]	+ 2
#4	+ 1	+ 2	+ 1	+ 2	+ 0.5	+ 2	[illegible]	+ 2.5
#5	+ 7	+ 8	+ 8	+ 7.5	+ 7.5	+ 3	+ [illegible]	+ 8

Hole #2

Surface Finish, AA 30-90 μ in. Bluing Pin Rollout
Protrusion, in. .202
Perpendicularity, .001 in./gage length
Longitudinal .001/INCH Transverse .020
Flush Gage Reading, in. .002
Capacitance Gage Reading: 366
EXIT BURR HEIGHT, IN. .013

70%

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	+ 2	+ 1	+ 2	+ 1	+ 2	+ 1	+ 2.5	+ 1
#2	+ 1	0	+ 1.5	+ 0	+ 1	+ 0.5	+ 1	0
#3	+ 1	0	+ 1	+ 0.5	+ 1	+ 0.5	0	+ 0.5
#4	+ 2	+ 2	+ 2	+ 1.5	+ 1	+ 1.5	+ 1	+ 2
#5	+ 4	+ 5	+ 5	+ 4	+ 2.5	+ 4	+ 3	+ 5

EFFECTS OF HOLE QUALITY

Test Series 2 Quality Variable INTERFERENCE (.0018)

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.905

Modify Good Holes Using Following Conditions:
Tool: UNDERSIZE OMARK DRILL-REAMER
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.954
Procedure: REAM HOLE SHALLOW THEN CO'SINK WITH UNDERSIZE REAMER

Results: Specimen No. 2E47 Hole #1

Surface Finish, AA 35-45 μ in.
Protrusion, in. .233
Perpendicularity, .001 in./gage length
Longitudinal .004/INCH Transverse .006/INCH
Flush Gage Reading, in. .002
Capacitance Gage Reading: 345

Bluing Pin Rollout

80%

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	0	+0.5	0	0	0	-0.5	0	0
#2	0	0	0	0	0	-0.5	0	0
#3	+1	0	0	0	0	0	0	0
#4	+1	+0.5	0	0	0	0	0	0
#5								

Hole #2

Surface Finish, AA 38-42 μ in.
Protrusion, in. .235
Perpendicularity, .001 in./gage length
Longitudinal .002/INCH Transverse .003/INCH
Flush Gage Reading, in. .003
Capacitance Gage Reading: 400

Bluing Pin Rollout

50%

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	0	0	0	0	0	0	0	0
#2	0	0	0	+0.5	0	0	0	0
#3	0	0	0	0	0	0	0	0
#4	0	0	0	0	0	0	0	+0.5
#5								

EFFECTS OF HOLE QUALITY

Test Series 2 Quality Variable INTERFERENCE (.0018)

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.905

Modify Good Holes Using Following Conditions:
Tool: UNDERSIZE OMARK DRILL-REAMER
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.954
Procedure: REAM HOLE SHALLOW, THEN CO'SINK WITH UNDERSIZE REAMER

Results: Specimen No. 5B6T Hole #1
Surface Finish, AA 55-65 μ in.
Protrusion, in. .236
Perpendicularity, .001 in./gage length
Longitudinal .003/INCH Transverse .005/INCH
Flush Gage Reading, in. .002
Capacitance Gage Reading: 387

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	0	0	0	+0.5	0	+1	+1	+1
#2	0	0	0	0	0	+0.5	+0.5	+0.5
#3	+0.5	+0.5	0	0	0	+0.5	+0.5	+0.5
#4	+1.5	+1.5	+1	0	+0.5	+1	+2	+1.5
#5								

Hole #2
Surface Finish, AA 45-55 μ in.
Protrusion, in. .227
Perpendicularity, .001 in./gage length
Longitudinal .002/INCH Transverse .008/INCH
Flush Gage Reading, in. .001
Capacitance Gage Reading: 390

Bluing Pin Rollout

80%

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	0	0	+0.5	+0.5	0	0	0	0
#2	0	0	+0.5	+1	+0.5	0	0	0
#3	0	0	0	0	0	0	0	0
#4	+1	+1	+1	0	0	0	0	0
#5								

EFFECTS OF HOLE QUALITY

Test Series 2 Quality Variable INTERFERENCE (.0018)

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.905

Modify Good Holes Using Following Conditions:
Tool: UNDERSIZE OMARK DRILL-REAMER
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.954
Procedure: REAM HOLE SHALLOW, THEN CO'SINK WITH UNDERSIZE REAMER

Results: Specimen No. 5E2B

Hole #1

Surface Finish, AA 50-60 μ in
Protrusion, in. .222
Perpendicularity, .001 in./gage length
Longitudinal .002/INCH Transverse 000
Flush Gage Reading, in. .002
Capacitance Gage Reading: 370

Bluing Pin Rollout

80%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	+ 0.5	0	0	0	0	0	+ 1	+ 1
#2	+ 0.5	0	0	0	0	+ 0.5	+ 1	+ 1
#3	+ 1	+ 1	+ 1	.05	0	0	− 1	+ 0.5
#4	+ 1.5	+ 1.5	+ 1.5	0	0	+ 1	+ 1	+ 1.5
#5								

Hole #2

Surface Finish, AA 36-44 μ in
Protrusion, in. .238
Perpendicularity, .001 in./gage length
Longitudinal 000 Transverse .010/INCH
Flush Gage Reading, in. .003
Capacitance Gage Reading: 396

Bluing Pin Rollout

60%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	+ 0.5	+ 1	+ 1	+ 1	0	0	0	+ 0.5
#2	+ 0.5	+ 1	+ 1	+ 1.5	+ 0.5	0	0	0
#3	0	0	0	+ 0.5	+ 0.5	+ 0.5	+ 0.5	0
#4	+ 1	+ 1	+ 1	+ 0.5	+ 0.5	+ 0.5	+ 0.5	+ 0.5
#5								

EFFECTS OF HOLE QUALITY

Test Series 2 Quality Variable INTERFERENCE (.0018)

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.905

Modify Good Holes Using Following Conditions:
Tool: UNDERSIZE OMARK DRILL-REAMER
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.954
Procedure: REAM HOLE SHALLOW, THEN CO'SINK WITH UNDERSIZE REAMER

Results: Specimen No. 5C5CT Hole #1
Surface Finish, AA 38-42 μ in.
Protrusion, in. .225
Perpendicularity, .001 in./gage length
Longitudinal .006/INCH Transverse .006/INCH
Flush Gage Reading, in. .003
Capacitance Gage Reading: 317

Bluing Pin Rollout

90%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	0	0	0	0	0	0	0	0
#2	0	0	0	0	0	0	0	0
#3	0	0	0	0	0	0	0	0
#4	0	0	0	0	0	0	0	0
#5								

Hole #2

Surface Finish, AA 35-44 μ in.
Protrusion, in. .242
Perpendicularity, .001 in./gage length
Longitudinal 000 Transverse .004/INCH
Flush Gage Reading, in. .002
Capacitance Gage Reading: 365

Bluing Pin Rollout

95%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	0	0	0	0	0	0	0	0
#2	0	0	0	0	0	0	0	0
#3	0	0	0	0	0	0	0	0
#4	0	0	0	0	0	0	0	0
#5								

EFFECTS OF HOLE QUALITY

Test Series 2 Quality Variable INTERFERENCE (.0048)

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.905

Modify Good Holes Using Following Conditions:
Tool: UNDERSIZE OMARK DRILL-REAMER
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.954
Procedure: REAM HOLE SHALLOW, THEN CO'SINK WITH UNDERSIZE REAMER

Results: Specimen No. 3BST Hole #1

Surface Finish, AA 38-44 μ in
Protrusion, in. .235
Perpendicularity, .001 in./gage length
Longitudinal .001/INCH Transverse .003/INCH
Flush Gage Reading, in. .003
Capacitance Gage Reading: 410

Bluing Pin Rollout

90%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	0	0	0	0	0	0	0	0
#2	0	0	0	0	0	0	0	0
#3	0	0	0	0	0	0	0	0
#4	0	0	0	0	0	0	0	0
#5								

Hole #2

Surface Finish, AA 35-44 μ in
Protrusion, in. .242
Perpendicularity, .001 in./gage length
Longitudinal .002/INCH Transverse 000
Flush Gage Reading, in. .003
Capacitance Gage Reading: 415

Bluing Pin Rollout

90%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	0	0	0	0	0	0	0	0
#2	0	0	0	0	0	0	0	0
#3	0	0	0	0	0	0	0	0
#4	0	0	0	0	0	0	0	0
#5								

EFFECTS OF HOLE QUALITY

Test Series 2 Quality Variable INTERFERENCE (.0040)

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.847

Modify Good Holes Using Following Conditions:
Tool: UNDERSIZE OMARK DRILL-REAMER
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.954
Procedure: REAM HOLE SHALLOW, THEN C'SINK WITH UNDERSIZE REAMER

Results: Specimen No. 5B6B Hole #1
Surface Finish, AA 25-35 μ in.
Protrusion, in. .292
Perpendicularity, .001 in./gage length
Longitudinal .005/INCH Transverse .001/INCH
Flush Gage Reading, in. .002
Capacitance Gage Reading: 268

Bluing Pin Rollout

80%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	0	+0.5	±0.5	+0.5	0	0	0	0
#2	+1	+0.5	±0.5	0	0	+1	+1	+1
#3	+1	+1	±0.5	0	0	0	+0.5	+1
#4	+4	+3.5	+2.5	+3	+3.5	+3.5	+3.5	+3.5
#5								

Hole #2
Surface Finish, AA 40-50 μ in.
Protrusion, in. .291
Perpendicularity, .001 in./gage length
Longitudinal .004/INCH Transverse .003/INCH
Flush Gage Reading, in. .002
Capacitance Gage Reading: 308

Bluing Pin Rollout

~10%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	+0.5	+1	+1	+1	0	0	0	0
#2	0	0	+0.5	+1	+1	+1	0	0
#3	+0.5	+0.5	+0.5	0	0	+0.5	0	0
#4	+2	+3	+3	+2.5	+2.5	+2	+2	+1.5
#5								

EFFECTS OF HOLE QUALITY

Test Series 2 Quality Variable INTERFERENCE (.0060)

Produce Good Hole Using Following Conditions:

Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)

Spindle, rpm 325 Feed: HAND 0.5 IPM

Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.847

Modify Good Holes Using Following Conditions:

Tool: UNDERSIZE OMARK DRILL-REAMER

Spindle, rpm 325 Feed: HAND - 0.5 IPM

Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.954

Procedure: REAM HOLE SHALLOW, THEN C'SINK WITH UNDERSIZE REAMER

Results: Specimen No. 4C6T Hole #1

Surface Finish, AA 38-42 μ in

Protrusion, in. .306

Perpendicularity, .001 in./gage length

Longitudinal .002/INCH Transverse .003/INCH

Flush Gage Reading, in. .004

Capacitance Gage Reading: 398

Bluing Pin Rollout

75%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	0	+0.5	0	+0.5	+0.5	+1	+1	0
#2	0	+0.5	0	+0.5	+0.5	0	0	+0.5
#3	+1	+1	+1	+0.5	+1	0	+1	+1.5
#4	+3	+4	+4	+4.5	+4.5	+4	+4.[illegible]	+5
#5								

Hole #2

Surface Finish, AA 35-45 μ in

Protrusion, in. .292

Perpendicularity, .001 in./gage length

Longitudinal .002/INCH Transverse .006/INCH

Flush Gage Reading, in. .002

Capacitance Gage Reading: 410

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	0	0	0	0	0	0	0	0
#2	0	0	0	0	0	0	0	0
#3	0	0	0	+0.5	+0.5	+0.5	-0.5	-0.5
#4	+1	+1	+1	+1	+1	+1.5	+1.5	+1.5
#5								

EFFECTS OF HOLE QUALITY

Test Series 2 Quality Variable INTERFERENCE (.0060)

Produce Good Hole Using Following Conditions:

Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)

Spindle, rpm 325 Feed: HAND 0.5 IPM

Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.847

Modify Good Holes Using Following Conditions:

Tool: UNDERSIZE OMARK DRILL - REAMER

Spindle, rpm 325 Feed: HAND - 0.5 IPM

Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.954

Procedure: REAM HOLE SHALLOW, THEN C'SINK WITH UNDERSIZE REAMER

Results: Specimen No. 4A5T Hole #1

Surface Finish, AA 38-45 μm

Protrusion, in. .292

Perpendicularity, .001 in./gage length

Longitudinal .002/INCH Transverse .001/INCH

Flush Gage Reading, in. .003

Capacitance Gage Reading: 355

Bluing Pin Rollout

25%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	0	+0.5	+0.5	+0.5	+0.5	+0.5	+0.5	+0.5
#2	0	0.5	0	+0.5	0	0	-0.5	0
#3	+0.5	+1	0	+0.5	0	0	0	0
#4	+4	+3.5	+3.5	+4	+3.5	+3.5	+4	+3
#5								

PARTIALLY OPEN

Hole #2

Surface Finish, AA 40-50 μm

Protrusion, in. .296

Perpendicularity, .001 in./gage length

Longitudinal .006/INCH Transverse .004/INCH

Flush Gage Reading, in. .003

Capacitance Gage Reading: 420

Bluing Pin Rollout

90%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	+0.5	+1	+1.5	+0.5	+0.5	0	0	0
#2	0	-0.5	+0.5	+0.5	+0.5	+0.5	0	0
#3	+0.5	0	+1	+0.5	+0.5	+0.5	0	+0.5
#4	+2	+2	+3	+1.5	+1	+2	+1.5	+2
#5								

EFFECTS OF HOLE QUALITY

Test Series 2 Quality Variable INTERFERENCE (.0060)

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.847

Modify Good Holes Using Following Conditions:
Tool: UNDERSIZE OMARK DRILL REAMER
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.954
Procedure: REAM HOLE SHALLOW, THEN C'SINK WITH UNDERSIZE REAMER

Results: Specimen No. 2D1T Hole #1

Surface Finish, AA 35-44 μ in.
Protrusion, in. .297
Perpendicularity, .001 in./gage length
Longitudinal .002/in Transverse .000
Flush Gage Reading, in. .002
Capacitance Gage Reading: 340

Bluing Pin Rollout

90%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	0	+0.5	+1	+0.5	+0.5	0	0	0
#2	+1	+0.5	0	+0.5	+0.5	+0.5	+1	+0.5
#3	+1	+0.5	0	+0.5	+0.5	+0.5	+0.5	+0.5
#4	+2.5	+2.5	+1	+2	+1.5	+2	+1.5	+1
#5								

Hole #2

Surface Finish, AA 36-45 μ in.
Protrusion, in. .292
Perpendicularity, .001 in./gage length
Longitudinal .003/inch Transverse .003/inch
Flush Gage Reading, in. .003
Capacitance Gage Reading: 380

Bluing Pin Rollout

85%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	+1	+1	+1	+1	+1	0	0	0
#2	0	-0.5	0	+1	+2	+1	+2.5	+0.5
#3	+0.5	+0.5	+0.5	+1	+2	+1	+2.5	+0.5
#4	+2.5	+3	+3	+2.5	+3	+2.5	+2	+0.5
#5								

EFFECTS OF HOLE QUALITY

Test Series 2 Quality Variable INTERFERENCE (.0060)

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.847

Modify Good Holes Using Following Conditions:
Tool: UNDERSIZE OMARK DRILL-REAMER
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.954
Procedure: REAM HOLE SHALLOW, THEN C'SINK WITH UNDERSIZE REAMER

Results: Specimen No. 3A1T Hole #1
Surface Finish, AA 36-45 μ in
Protrusion, in. .291
Perpendicularity, .001 in./gage length
Longitudinal .003/INCH Transverse .004/INCH
Flush Gage Reading, in. .002
Capacitance Gage Reading: 344

Bluing Pin Rollout

90%

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	+ 0.5	+ 1	+ 0.5	0	0	+ 0.5	+ 1	+ 1
#2	+ 0.5	+ 1	+ 0.5	+ 0.5	0	+ 0.5	+ 0	+ 0.5
#3	+ 1.5	+ 1.5	+ 1	+ 0.5	0	+ 0.5	+ 0.5	+ 1
#4	+ 4	+ 5	+ 5	+ 3.5	+ 3	+ 3	+ 3	+ 3.5
#5								

Hole #2

Surface Finish, AA 38-44 μ in
Protrusion, in. .284
Perpendicularity, .001 in./gage length
Longitudinal .007/INCH Transverse .002/INCH
Flush Gage Reading, in. .003
Capacitance Gage Reading: 359

Bluing Pin Rollout

90%

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	0	0	0	0	0	+ 0.5	+ 0.5	0
#2	- 0.5	+ 0.5	+ 0.5	+ 1	+ 1	+ 1	+ 0.5	- 0.5
#3	0	+ 0.5	0	+ 1	+ 0.5	+ 1	+ 0.5	0
#4	+ 1.5	+ 1	+ 1	+ 1	+ 1	+ 1	+ 1.5	+ 1.5
#5								

INSPECTION SHEETS FOR TEST SERIES 4, 5, AND 6

CRACK GROWTH TESTING

MANUFACTURING REPORT: TAPERED HOLES

Test Series 4 Quality Variable ______
Specimen No. 3C3T

Hole Manufacturing Conditions and Procedures: ______

Spindle, rpm ______ Feed: ______
Cutting Fluid: ______ Depth: (Ind. Reading) ______

Hole #1

Surface Finish, AA 22-24
Protrusion, in. 0
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .001
Flush Gage Reading, in. 002
Capacitance Gage Reading 251
Exit Burr Height, in. ______

Bluing Pin Rollout

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1							
#2							
#3							
#6	4.0	6.0	5.0	7.0	4.0	5.0	6.0
#7	1.0	3.0	3.0	3.0	2.0	3.0	3.0

Hole #2

Surface Finish, AA 50-52
Protrusion, in. 0
Perpendicularity, .001 in./in.
Longitudinal .003 Transverse .0005
Flush Gage Reading, in. .003
Capacitance Gage Reading 233
Exit Burr Height, in. ______

Bluing Pin Rollout

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1							
#2							
#3							
#6	6.0	4.0	3.0	4.0	6.0	7.0	2.0
#7	3.0	2.0	1.0	4.0	4.0	5.0	2.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 4 Quality Variable ______
Specimen No. 5A2T

Hole Manufacturing Conditions and Procedures: ______

Spindle, rpm ______ Feed: ______
Cutting Fluid: ______ Depth: (Ind. Reading) ______

Hole #1

Surface Finish, AA 34-36
Protrusion, in. 0
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse .005
Flush Gage Reading, in. .003
Capacitance Gage Reading 275
Exit Burr Height, in. ______

Bluing Pin Rollout

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1							
#2							
#3							
#6	3.0	3.0	4.0	5.0	4.0	2.0	5.0
#7	0	3.0	2.0	4.0	1.0	1.0	4.0

Hole #2

Surface Finish, AA 14-16
Protrusion, in. 0
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse .003
Flush Gage Reading, in. .002
Capacitance Gage Reading 293
Exit Burr Height, in. ______

Bluing Pin Rollout

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1							
#2							
#3							
#6	4.0	3.0	3.0	4.0	4.0	5.0	3.0
#7	1.0	1.0	1.0	1.0	3.0	1.0	2.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 4 Quality Variable ______
Specimen No. 5B1C7

Hole Manufacturing Conditions and Procedures: ______

Spindle, rpm ______ Feed: ______
Cutting Fluid: ______ Depth: (Ind. Reading) ______

Hole #1

Surface Finish, AA 22-24
Protrusion, in. 0
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse .00035
Flush Gage Reading, in. .002
Capacitance Gage Reading 288
Exit Burr Height, in. ______

Bluing Pin Rollout

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1							
#2							
#3							
#6	4.0	3.0	4.0	4.0	4.0	[illegible].0	2.0
#7	2.0	1.0	1.0	2.0	2.0	3.0	1.0

Hole #2

Surface Finish, AA 18-20
Protrusion, in. 0
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse .0005
Flush Gage Reading, in. 0
Capacitance Gage Reading 276
Exit Burr Height, in. ______

Bluing Pin Rollout

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1							
#2							
#3							
#6	4.0	3.0	3.0	4.0	6.0	4.0	4.0
#7	3.0	1.0	0	0	4.0	3.0	2.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 5 Quality Variable ______

Specimen No. 313613

Hole Manufacturing Conditions and Procedures: ______

Spindle, rpm ______ Feed: ______

Cutting Fluid: ______ Depth: (Ind. Reading) ______

Hole #1

Surface Finish, AA 28-32

Protrusion, in. 0

Perpendicularity, .001 in./in.

Longitudinal .001 Transverse .001

Flush Gage Reading, in. .002

Capacitance Gage Reading 253

Exit Burr Height, in. ______

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	—	—	—	—	—	—	—
#2	11.0	5.0	13.0	10.0	11.0	4.0	13.0
#3	12.0	3.0	11.0	5.0	12.0	5.0	9.0
#4	10.0	3.0	7.0	6.0	11.0	8.0	3.0
#5	8.0	5.0	6.0	6.0	10.0	9.0	4.0

Hole #2

Surface Finish, AA 22-24

Protrusion, in. 0

Perpendicularity, .001 in./in.

Longitudinal .001 Transverse 0

Flush Gage Reading, in. .003

Capacitance Gage Reading 288

Exit Burr Height, in. ______

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	—	—	—	—	—	—	—
#2	12.0	11.0	1.0	10.0	11.0	11.0	6.0
#3	10.0	11.0	4.0	11.0	8.0	12.0	3.0
#4	6.0	9.0	4.0	10.0	3.0	9.0	5.0
#5	6.0	7.0	5.0	9.0	4.0	7.0	5.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 5 Quality Variable ____________
Specimen No. 5B113

Hole Manufacturing Conditions and Procedures: ____________

Spindle, rpm ________ Feed: ________
Cutting Fluid: ________ Depth: (Ind. Reading) ________

Hole #1

Surface Finish, AA 33-35
Protrusion, in. 0
Perpendicularity, .001 in./in.
Longitudinal .0015 Transverse .0005
Flush Gage Reading, in. 0
Capacitance Gage Reading 284
Exit Burr Height, in. ________

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	180°	225°	270°	315°
Bottom #1	14.0	15.0	15.0	15.0	15.0	15.0	—
#2	10.0	8.0	3.0	4.0	8.0	8.0	3.0
#3	9.0	9.0	4.0	7.0	2.0	9.0	1.0
#4	2.0	5.0	0	5.0	0	5.0	0
#5	1.0	4.0	2.0	9.0	5.0	4.0	1.0

Hole #2

Surface Finish, AA 30-35
Protrusion, in. 0
Perpendicularity, .001 in./in.
Longitudinal .002 Transverse 0
Flush Gage Reading, in. 0
Capacitance Gage Reading 229
Exit Burr Height, in. ________

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	180°	225°	270°	315°
Bottom #1	15.0	15.0	15.0	15.0	15.0	15.0	15.0
#2	9.0	12.0	6.0	11.0	4.0	12.0	0
#3	6.0	12.0	10.0	11.0	2.0	11.0	8.0
#4	4.0	10.0	10.0	10.0	0	7.0	8.0
#5	7.0	9.0	9.0	8.0	2.0	5.0	9.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 5 Quality Variable ______
Specimen No. 4E3T

Hole Manufacturing Conditions and Procedures: ______

Spindle, rpm ______ Feed: ______
Cutting Fluid: ______ Depth: (Ind. Reading) ______

Hole #1

Surface Finish, AA 14-16
Protrusion, in. 0
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .002
Flush Gage Reading, in. 0
Capacitance Gage Reading 367
Exit Burr Height, in. ______

Bluing Pin Rollout

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	15.0	14.0	14.0	14.0	14.0	14.0	14.0
#2	11.0	13.0	13.0	12.0	5.0	10.0	12.0
#3	2.0	7.0	7.0	7.0	4.0	6.0	5.0
#4	-2.0	4.0	4.0	4.0	-1.0	2.0	6.0
#5	-2.0	2.0	3.0	4.0	1.0	-1.0	3.0

Hole #2

Surface Finish, AA 18-20
Protrusion, in. 0
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .002
Flush Gage Reading, in. .002
Capacitance Gage Reading 332
Exit Burr Height, in. ______

Bluing Pin Rollout

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	15.0	14.0	14.0	14.0	14.0	14.0	14.0
#2	—	—	—	—	—	—	—
#3	6.0	5.0	2.0	4.0	9.0	6.0	5.0
#4	3.0	2.0	-3.0	3.0	4.0	5.0	0
#5	2.0	3.0	0	0	0	2.0	2.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 6 Quality Variable ______
Specimen No. 3D41R

Hole Manufacturing Conditions and Procedures: ______

Spindle, rpm ______ Feed: ______
Cutting Fluid: ______ Depth: (Ind. Reading) ______

Hole #1

Surface Finish, AA 60-65
Protrusion, in. 0
Perpendicularity, .001 in./in.
Longitudinal .0005 Transverse 0
Flush Gage Reading, in. .001
Capacitance Gage Reading 284
Exit Burr Height, in. ______

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	14.0	—	—	—	—	—	—
#2	11.0	9.0	0	1.0	12.0	8.0	2.0
#3	9.0	9.0	2.0	4.0	9.0	10.0	2.0
#4	7.0	8.0	0	5.0	7.0	8.0	4.0
#5	4.0	7.0	3.0	9.0	4.0	6.0	3.0

Hole #2

Surface Finish, AA 20-22
Protrusion, in. 0
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .002
Flush Gage Reading, in. .002
Capacitance Gage Reading 321
Exit Burr Height, in. ______

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	—	—	—	—	—	—	—
#2	14.0	8.0	15.0	11.0	15.0	10.0	14.0
#3	10.0	6.0	5.0	5.0	13.0	4.0	9.0
#4	5.0	3.0	-5.0	6.0	8.0	3.0	4.0
#5	3.0	2.0	-4.0	4.0	6.0	6.0	2.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 6 Quality Variable ____________
Specimen No. 4C24

Hole Manufacturing Conditions and Procedures: ____________

Spindle, rpm ________ Feed: ________
Cutting Fluid: ________ Depth: (Ind. Reading) ________

Hole #1

Surface Finish, AA 50-55 — Bluing Pin Rollout
Protrusion, in. 0
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .001
Flush Gage Reading, in. .002
Capacitance Gage Reading 274
Exit Burr Height, in. ________

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	—	—	—	—	—	—	—
#2	15.0	8.0	10.0	10.0	10.0	14.0	11.0
#3	14.0	13.0	9.0	11.0	9.0	15.0	10.0
#4	12.0	13.0	9.0	13.0	11.0	14.0	9.0
#5	11.0	14.0	9.0	12.0	11.0	13.0	11.0

Hole #2

Surface Finish, AA 25-26 — Bluing Pin Rollout
Protrusion, in. 0
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse .001
Flush Gage Reading, in. 0
Capacitance Gage Reading 245
Exit Burr Height, in. ________

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	—	—	—	—	—	—	—
#2	14.0	9.0	11.0	5.0	14.0	9.0	12.0
#3	12.0	11.0	6.0	6.0	13.0	11.0	7.0
#4	10.0	11.0	3.0	8.0	10.0	11.0	[illegible]
#5	9.0	11.0	5.0	9.0	8.0	9.0	[illegible]

MANUFACTURING REPORT: TAPERED HOLES

Test Series 6 Quality Variable ______
Specimen No. 3D513

Hole Manufacturing Conditions and Procedures: ______

Spindle, rpm ______ Feed: ______
Cutting Fluid: ______ Depth: (Ind. Reading) ______

Hole #1

Surface Finish, AA 18-20
Protrusion, in. 0
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse 0
Flush Gage Reading, in. 0
Capacitance Gage Reading 331
Exit Burr Height, in. ______

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	180°	225°	270°	315°
Bottom #1	—	—	—	—	—	—	—
#2	14.0	—	—	—	—	14.0	—
#3	8.0	9.0	11.0	11.0	9.0	4.0	9.0
#4	8.0	4.0	8.0	7.0	7.0	1.0	7.0
#5	8.0	0	6.0	4.0	7.0	-1.0	5.0

Hole #2

Surface Finish, AA 55-60
Protrusion, in. 0
Perpendicularity, .001 in./in.
Longitudinal .0005 Transverse .001
Flush Gage Reading, in. 0
Capacitance Gage Reading 224
Exit Burr Height, in. ______

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	180°	225°	270°	315°
Bottom #1	—	—	—	—	—	—	—
#2	11.0	13.0	3.0	9.0	10.0	12.0	2.0
#3	9.0	13.0	5.0	12.0	8.0	13.0	6.0
#4	8.0	12.0	6.0	11.0	4.0	11.0	8.0
#5	10.0	12.0	7.0	12.0	9.0	11.0	10.0

INSPECTION SHEETS FOR TEST SERIES 7 - PERPENDICULARITY

EFFECTS OF HOLE QUALITY

Test Series 7 Quality Variable PERPENDICULARITY DEVIATION - 3° MIN. INTERFERENCE

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.755

Modify Good Holes Using Following Conditions:
Tool: GROUP 2 OMARK DRILL-REAMER
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.180
Procedure: SET HEAD ANGLE 3° IN TRANSVERSE DIRECTION, SCRIBE HOLE LOCATION, POSITION TABLE IN TRANSVERSE DIRECTION USING CENTERING MICROSCOPE IN SPINDLE - DRILL & REAM HOLE FOR NOMINAL INTERFERENCE THEN REAM .060" DEEPER WITH GR. 2 REAMER

Results: Specimen No. 5B1T Hole #1

Surface Finish, AA 32
Protrusion, in. .148
Perpendicularity, .001 in./gage length
Longitudinal .001/INCH Transverse .051/INCH
Flush Gage Reading, in. 028
Capacitance Gage Reading: 370 337 425 496

Bluing Pin Rollout 70%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	0	0	0	0	0	0	0	0
#2	0	0	0	0	0	0	0	0
#3	0	0	0	0	0	0	0	0
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0

Hole #2

Surface Finish, AA 28
Protrusion, in. .157
Perpendicularity, .001 in./gage length
Longitudinal .00[illegible]/INCH Transverse .050/INCH
Flush Gage Reading, in. 030
Capacitance Gage Reading: 357 426 477 720

Bluing Pin Rollout 80%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	0	0	0	0	0	0	0	0
#2	0	0	0	0	0	0	0	0
#3	0	0	0	0	0	0	0	0
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0

EFFECTS OF HOLE QUALITY

Test Series 7 Quality Variable PERPENDICULARITY DEVIATION - 3°
MIN. INTERFERENCE

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.757

Modify Good Holes Using Following Conditions:
Tool: GROUP 2 OMARK DRILL-REAMER
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.180
Procedure: SET HEAD ANGLE 3° IN TRANSVERSE DIRECTION, SCRIBE HOLE LOCATION, POSITION TABLE IN TRANSVERSE DIRECTION USING CENTERING MICROSCOPE IN SPINDLE - DRILL & REAM HOLE FOR NOMINAL INTERFERENCE THEN REAM .060" DEEPER WITH GR. 2 REAMER

Results: Specimen No. 5D5C8 Hole #1

Surface Finish, AA 26
Protrusion, in. .143
Perpendicularity, .001 in./gage length
Longitudinal .002/INCH Transverse .053/INCH
Flush Gage Reading, in. .029
Capacitance Gage Reading: 330 366 384 537 75%

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
	Angular Position							
Bottom #1	0	0	0	0	0		[illegible]	0
#2	0	0	0	0	0	[illegible]	[illegible]	0
#3	0	0	0	0	0	[illegible]	[illegible]	0
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0

Hole #2

Surface Finish, AA 65
Protrusion, in. .135
Perpendicularity, .001 in./gage length
Longitudinal .004/INCH Transverse .051/INCH
Flush Gage Reading, in. .028
Capacitance Gage Reading: 346 351 371 401 70%

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
	Angular Position							
Bottom #1	0	0	[illegible]	[illegible]	[illegible]	[illegible]	0	0
#2	0	0	[illegible]	[illegible]	0	0	0	0
#3	0	0	0	[illegible]	[illegible]	0	0	0
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0

EFFECTS OF HOLE QUALITY

Test Series 7 Quality Variable PERPENDICULARITY DEVIATION - 3° MIN. INTERFERENCE

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.757

Modify Good Holes Using Following Conditions:
Tool: GROUP 2 OMARK DRILL-REAMER
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.180
Procedure: SET HEAD ANGLE 3° IN TRANSVERSE DIRECTION, SCRIBE HOLE LOCATION, POSITION TABLE IN TRANSVERSE DIRECTION USING CENTERING MICROSCOPE IN SPINDLE - DRILL & REAM HOLE FOR NOMINAL INTERFERENCE THEN REAM .060" DEEPER WITH GR. 2 REAMER

Results: Specimen No. 5A4T Hole #1
Surface Finish, AA 22 Bluing Pin Rollout
Protrusion, in. .141
Perpendicularity, .001 in./gage length
Longitudinal .003/INCH Transverse .055/INCH
Flush Gage Reading, in. .026
Capacitance Gage Reading: 410 350 375 490 70

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	0	0	0	0	0	0	0	0
#2	0	0	0	0	0	0	0	0
#3	0	0	0	0	0	0	0	0
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0

Hole #2

Surface Finish, AA 32 Bluing Pin Rollout
Protrusion, in. .143
Perpendicularity, .001 in./gage length
Longitudinal .003/INCH Transverse .05[illegible]/INCH
Flush Gage Reading, in. .020
Capacitance Gage Reading: 400 388 413 [illegible]

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	0	0	0	0	0	0	0	0
#2	0	0	0	0	0	0	0	0
#3	0	0	0	0	0	0	0	0
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0

EFFECTS OF HOLE QUALITY

Test Series 7 Quality Variable PERPENDICULARITY DEVIATION - 3°
MIN. INTERFERENCE

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) .757

Modify Good Holes Using Following Conditions:
Tool: GROUP 2 OMARK DRILL-REAMER
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.180
Procedure: SET HEAD ANGLE 3° IN TRANSVERSE DIRECTION, SCRIBE HOLE LOCATION, POSITION TABLE IN TRANSVERSE DIRECTION USING CENTERING MICROSCOPE IN SPINDLE - DRILL & REAM HOLE FOR NOMINAL INTERFERENCE THEN REAM .060" DEEPER WITH GR. 2 REAMER

Results: Specimen No. [illegible] Hole #1

Surface Finish, AA 21
Protrusion, in. .140
Perpendicularity, .001 in./gage length
Longitudinal .001/INCH Transverse .052/INCH
Flush Gage Reading, in. .027
Capacitance Gage Reading: 325 355 [illegible] 419 70%

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	0	0	0	0	0	0	0	0
#2	0	0	0	0	0	0	0	0
#3	0	0	0	0	0	0	0	0
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0

Hole #2

Surface Finish, AA 22
Protrusion, in. .145
Perpendicularity, .001 in./gage length
Longitudinal .001/INCH Transverse .054/IN[illegible]
Flush Gage Reading, in. .027
Capacitance Gage Reading: 408 390 405 386 80%

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	0	0	0	0	0	0	0	0
#2	0	0	0	0	0	0	0	0
#3	0	0	0	0	0	0	0	0
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0

EFFECTS OF HOLE QUALITY

Test Series 7 Quality Variable PERPENDICULARITY DEVIATION - 3° MIN. INTERFERENCE

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.755

Modify Good Holes Using Following Conditions:
Tool: GROUP 2 OMARK DRILL-REAMER
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.180
Procedure: SET HEAD ANGLE 3° IN TRANSVERSE DIRECTION, SCRIBE HOLE LOCATION, POSITION TABLE IN TRANSVERSE DIRECTION USING CENTERING MICROSCOPE IN SPINDLE - DRILL & REAM HOLE FOR NOMINAL INTERFERENCE THEN REAM .060" DEEPER WITH GR. 2 REAMER

Results: Specimen No. 5A4E Hole #1
Surface Finish, AA 60 Bluing Pin Rollout
Protrusion, in. .143
Perpendicularity, .001 in./gage length
Longitudinal .001/INCH Transverse .051/INCH
Flush Gage Reading, in. .030
Capacitance Gage Reading: 371 371 367 436 70%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	0	0	0	0	0	0	0	0
#2	0	0	0	0	0	0	0	0
#3	0	0	0	0	0	0	0	0
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0

Hole #2

Surface Finish, AA 28 Bluing Pin Rollout
Protrusion, in. .138
Perpendicularity, .001 in./gage length
Longitudinal .002/INCH Transverse .053/INCH
Flush Gage Reading, in. .029
Capacitance Gage Reading: 374 367 382 531 70%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	0	0	0	0	0	0	0	0
#2	0	0	0	0	0	0	0	0
#3	0	0	+0.5	0	0	0	0	0
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0

EFFECTS OF HOLE QUALITY

Test Series 7 Quality Variable PERPENDICULARITY DEVIATION - 3° MIN. INTERFERENCE

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.755

Modify Good Holes Using Following Conditions:
Tool: GROUP 2 OMARK DRILL-REAMER
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.180
Procedure: SET HEAD ANGLE 3° IN TRANSVERSE DIRECTION, SCRIBE HOLE LOCATION, POSITION TABLE IN TRANSVERSE DIRECTION USING CENTERING MICROSCOPE IN SPINDLE - DRILL & REAM HOLE FOR NOMINAL INTERFERENCE THEN REAM .060" DEEPER WITH GR. 2 REAMER

Results: Specimen No. 2BGT Hole #1

Surface Finish, AA 40
Protrusion, in. .137
Perpendicularity, .001 in./gage length
Longitudinal .001/INCH Transverse .051/INCH
Flush Gage Reading, in. .027
Capacitance Gage Reading: 420 313 274 402 70%

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	0	0	0	0	0	0	0	0
#2	0	0	0	0	0	0	0	0
#3	0	0	0	0	0	0	-0.5	0
#4	+0.5	+0.5	+0.5	0	0	0	0	0
#5	0	0	0	0	0	0	0	0

Hole #2

Surface Finish, AA 140
Protrusion, in. .145
Perpendicularity, .001 in./gage length
Longitudinal .003/INCH Transverse .052/INCH
Flush Gage Reading, in. .028
Capacitance Gage Reading: 411 418 406 80%

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	0	0	0	0	0	0	0	0
#2	0	0	0	0	0	0	0	0
#3	0	0	0	0	0	0	0	0
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0

EFFECTS OF HOLE QUALITY

Test Series 7 Quality Variable PERPENDICULARITY DEVIATION - 3° MIN. INTERFERENCE

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.155

Modify Good Holes Using Following Conditions:
Tool: GROUP 2 OMARK DRILL-REAMER
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.180
Procedure: SET HEAD ANGLE 3° IN TRANSVERSE DIRECTION, SCRIBE HOLE LOCATION, POSITION TABLE IN TRANSVERSE DIRECTION USING CENTERING MICROSCOPE IN SPINDLE - DRILL & REAM HOLE FOR NOMINAL INTERFERENCE THEN REAM .060" DEEPER WITH GR. 2 REAMER

Results: Specimen No. 5C37 Hole #1
Surface Finish, AA 32
Protrusion, in. .152
Perpendicularity, .001 in./gage length
Longitudinal 0 Transverse .053/INCH
Flush Gage Reading, in. .023
Capacitance Gage Reading: 419 400 .739 432

Bluing Pin Rollout 70%

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5
#2	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5
#3	0	0	0	0	0	0	0	0
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0

Hole #2

Surface Finish, AA 105
Protrusion, in. .152
Perpendicularity, .001 in./gage length
Longitudinal .003/INCH Transverse .055/INCH
Flush Gage Reading, in. .031
Capacitance Gage Reading: 427 342

Bluing Pin Rollout 70%

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	-0.5	-0.5	-0.5	0	0	0	-0.5	-0.5
#2	0	0	0	0	0	0	0	0
#3	0	0	0	0	0	0	0	0
#4	0	+0.5	+0.5	+0.5	+0.5	+0.5	0	0
#5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5

EFFECTS OF HOLE QUALITY

Test Series 7 Quality Variable PERPENDICULARITY DEVIATION - 3°
MIN. INTERFERENCE

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.255

Modify Good Holes Using Following Conditions:
Tool: GROUP 2 OMARK DRILL-REAMER
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.130
Procedure: SET HEAD ANGLE 3° IN TRANSVERSE DIRECTION, SCRIBE HOLE LOCATION, POSITION TABLE IN TRANSVERSE DIRECTION USING CENTERING MICROSCOPE IN SPINDLE - DRILL & REAM HOLE FOR NOMINAL INTERFERENCE THEN REAM .060" DEEPER WITH GR. 2 REAMER

Results: Specimen No. 5C3-[illegible] Hole #1

Surface Finish, AA 30
Protrusion, in. .156
Perpendicularity, .001 in./gage length
Longitudinal .101/INCH Transverse .053/INCH
Flush Gage Reading, in. .029
Capacitance Gage Reading: 1'4 352/440 514

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	0	0	0	0	0	0	0	0
#2	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5
#3	0	0	0	0	0	0	0	0
#4	0	+0.5	+0.5	+0.5	+0.5	0	0	0
#5	0	0	0	0	0	0	0	0

Hole #2

Surface Finish, AA 30
Protrusion, in. .155
Perpendicularity, .001 in./gage length
Longitudinal .201/INCH Transverse .051/INCH
Flush Gage Reading, in. .028
Capacitance Gage Reading: 4:0 417/400 600

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	-1	-1	-1	-1	-1	-1	-1	-1
#2	0	0	0	0	0	0	0	0
#3	0	0	0	0	0	0	0	0
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0

EFFECTS OF HOLE QUALITY

Test Series 7 Quality Variable PERPENDICULARITY DEVIATION - 3° MIN. INTERFERENCE

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.755

Modify Good Holes Using Following Conditions:
Tool: GROUP 2 OMARK DRILL-REAMER
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.180
Procedure: SET HEAD ANGLE 3° IN TRANSVERSE DIRECTION; SCRIBE HOLE LOCATION, POSITION TABLE IN TRANSVERSE DIRECTION USING CENTERING MICROSCOPE IN SPINDLE - DRILL & REAM HOLE FOR NOMINAL INTERFERENCE THEN REAM .060" DEEPER WITH GR. 2 REAMER

Results: Specimen No. 5E4CE Hole #1
Surface Finish, AA 18
Protrusion, in. .156
Perpendicularity, .001 in./gage length
Longitudinal .001/INCH Transverse .050/INCH
Flush Gage Reading, in. .028
Capacitance Gage Reading: 479

387
348

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5
#2	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5
#3	0	0	0	0	0	0	0	0
#4	-0.5	0	0	0	0	0	0	-0.5
#5	0	0	0	0	0	0	0	0

Hole #2
Surface Finish, AA 80
Protrusion, in. .142
Perpendicularity, .001 in./gage length
Longitudinal .001/INCH Transverse .053/INCH
Flush Gage Reading, in. .028
Capacitance Gage Reading: 420

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5
#2	0	0	0	0	0	0	0	0
#3	0	0	0	0	0	0	0	0
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0

EFFECTS OF HOLE QUALITY

Test Series 7 Quality Variable *Perpendicularity Deviation - 3°*
Min. Interference

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm *325* Feed: *Hand - 0.5 IPM*
Cutting Fluid: *Stoddard Solvent* Depth: (Ind. Reading) *1.755*

Modify Good Holes Using Following Conditions:
Tool: *Group 2 Omark Drill-Reamer*
Spindle, rpm *325* Feed: *Hand - 0.5 IPM*
Cutting Fluid: *Stoddard Solvent* Depth: (Ind. Reading) *1.180*
Procedure: *Set head angle 3° in transverse direction, scribe hole location, position table in transverse direction using centering microscope in spindle - drill & ream hole for nominal interference then ream .060" deeper with Gr. 2 reamer*

Results: Specimen No. *6A-1B* Hole #1
Surface Finish, AA *31*
Protrusion, in. *.150*
Perpendicularity, .001 in./gage length
Longitudinal *0* Transverse *.055/inch*
Flush Gage Reading, in. *.027* *3-15*
Capacitance Gage Reading: *440* *4.4* *4.2"*

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	0	0	0	0	0	0	0	0
#2	0	0	0	0	0	0	0	0
#3	0	0	0	0	0	0	0	0
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0

Hole #2
Surface Finish, AA *28*
Protrusion, in. *.154*
Perpendicularity, .001 in./gage length
Longitudinal *.05/inch* Transverse [illegible]
Flush Gage Reading, in. *.030*
Capacitance Gage Reading: *452* *4.0* *3-9* *520*

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	0	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
#2	0	0	[illegible]	0	0	[illegible]	[illegible]	[illegible]
#3	0	0	0	[illegible]	[illegible]	[illegible]	[illegible]	0
#4	0	0	[illegible]	[illegible]	0	0	[illegible]	[illegible]
#5	0	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

EFFECTS OF HOLE QUALITY

Test Series 7 Quality Variable PERPENDICULARITY DEVIATION - 3° MAX. INTERFERENCE

Produce Good Hole Using Following Conditions:

Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)

Spindle, rpm 325 Feed: HAND - 0.5 IPM

Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.715

Modify Good Holes Using Following Conditions:

Tool: UNDERSIZE OMARK DRILL REAMER

Spindle, rpm 325 Feed: HAND - 0.5 IPM

Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.810

Procedure: SET HEAD ANGLE 3° IN TRANSVERSE DIRECTION, SCRIBE HOLE LOCATION, POSITION TABLE IN TRANSVERSE DIRECTION USING CENTERING MICROSCOPE IN SPINDLE — DRILL & REAM HOLE SHALLOW BY .060" THEN C'SINK WITH UNDERSIZE DRILL-REAMER

Results: Specimen No. 5B2T Hole #1

Surface Finish, AA 28

Protrusion, in. .253

Perpendicularity, .001 in./gage length

Longitudinal .02/INCH Transverse .053/INCH

Flush Gage Reading, in. .029

Capacitance Gage Reading: 350 335

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	0	0	0	0	0	0	0	0
#2	0	0	0	0	0	0	0	0
#3	0	0	0	0	0	0	0	0
#4	0	0	0		0	0	0	0
#5								

Hole #2

Surface Finish, AA 80

Protrusion, in. .225

Perpendicularity, .001 in./gage length

Longitudinal .05/INCH Transverse .05/INCH

Flush Gage Reading, in. .029

Capacitance Gage Reading: 402 290

Bluing Pin Rollout

60%

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	0	0	0	0	0	0	0	-
#2	0	0	0	0	0	0	0	-
#3								0
#4	+0.5	+0.5	+0.5	+0.5	+0.5	+0.5	+0.5	+0.5
#5	0	0	0	0	0	0	0	0

9/1/7-

EFFECTS OF HOLE QUALITY

Test Series 7 Quality Variable PERPENDICULARITY DEVIATION - 3° MAX. INTERFERENCE

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.715

Modify Good Holes Using Following Conditions:
Tool: UNDERSIZE OMARK DRILL REAMER
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.510
Procedure: SET HEAD ANGLE 3° IN TRANSVERSE DIRECTION, SCRIBE HOLE LOCATION, POSITION TABLE IN TRANSVERSE DIRECTION USING CENTERING MICROSCOPE IN SPINDLE - DRILL & REAM HOLE SHALLOW BY .060", THEN C'SINK WITH UNDERSIZE DRILL-REAMER

Results: Specimen No. 5P3CT Hole #1
Surface Finish, AA 36 Bluing Pin Rollout
Protrusion, in. .253
Perpendicularity, .001 in./gage length
Longitudinal .001/inch Transverse .055/inch
Flush Gage Reading, in. .030 352
Capacitance Gage Reading: 400 351 75%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	0	0	0	0	0	0	0	0
FAY → #2	0	0	0	0	0	0	0	0
#3	0	0	0	0	0	0	0	0
#4	0	0	0	0	0	0	0	0
#5								

Hole #2

Surface Finish, AA 32 Bluing Pin Rollout
Protrusion, in. .246
Perpendicularity, .001 in./gage length
Longitudinal .003/inch Transverse .055/inch
Flush Gage Reading, in. .030
Capacitance Gage Reading: 368 370 366 70%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	0	0	0	0	0	0	0	0
#2	0	0	0	0	0	0	0	0
#3	0	0	0	0	0	0	0	0
#4	0	0	0	0	0	0	0	0
#5								

9/1/-3?

EFFECTS OF HOLE QUALITY

Test Series 7 Quality Variable PERPENDICULARITY DEVIATION - 3° MAX. INTERFERENCE

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.715

Modify Good Holes Using Following Conditions:
Tool: UNDERSIZE OMARK DRILL REAMER
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.810
Procedure: SET HEAD ANGLE 3° IN TRANSVERSE DIRECTION, SCRIBE HOLE LOCATION, POSITION TABLE IN TRANSVERSE DIRECTION USING CENTERING MICROSCOPE IN SPINDLE — DRILL & REAM HOLE SHALLOW BY .060" THEN CO'SINK WITH UNDERSIZE DRILL-REAMER

Results: Specimen No. 5D6CT Hole #1

Surface Finish, AA 28
Protrusion, in. .242
Perpendicularity, .001 in./gage length
Longitudinal 002 Transverse .053
Flush Gage Reading, in. .027
Capacitance Gage Reading: 400 556 380

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)

FAY → #2

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	0	0	0	0	0	0	0	0
#2	0	0	+.005	+.005	0	[illegible]	[illegible]	0
#3	0	0	0	0	0	0	0	0
#4	0	0	0	0		0	0	0
#5								

Hole #2

Surface Finish, AA 32
Protrusion, in. 248
Perpendicularity, .001 in./gage length
Longitudinal 001 Transverse 054
Flush Gage Reading, in. .029
Capacitance Gage Reading: 402 385 410

Bluing Pin Rollout

80%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	0	0	0	0	0	0	0	0
#2	0	0	0	0	0	0	0	0
#3	0	0	0	0	0	0	0	0
#4	0	0	0	0	0	0	0	0
#5								

9/1/76 [illegible]

EFFECTS OF HOLE QUALITY

Test Series 7 Quality Variable PERPENDICULARITY DEVIATION - 3° MAX. INTERFERENCE

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.715

Modify Good Holes Using Following Conditions:
Tool: UNDERSIZE OMARK DRILL REAMER
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.5..
Procedure: SET HEAD ANGLE 3° IN TRANSVERSE DIRECTION, SCRIBE HOLE LOCATION, POSITION TABLE IN TRANSVERSE DIRECTION USING CENTERING MICROSCOPE IN SPINDLE - DRILL & REAM HOLE SHALLOW BY .060" THEN C'SINK WITH UNDERSIZE DRILL-REAMER

Results: Specimen No. 5AGCT Hole #1

Surface Finish, AA 25
Protrusion, in. .239
Perpendicularity, .001 in./gage length
Longitudinal .003/INCH Transverse .055/INCH
Flush Gage Reading, in. .026
Capacitance Gage Reading: 365 366 362

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	0	0	0	0	0	0	0	0
1 AY → #2	0	+0.5	+0.5	+0.5	+0.5	+0.5	+0.5	+0.5
#3	0	0	0	0	0	0	0	0
#4	0	0	0	0	0	0	0	0
#5								

Hole #2

Surface Finish, AA 30
Protrusion, in. .226
Perpendicularity, .001 in./gage length
Longitudinal [illegible] Transverse [illegible]
Flush Gage Reading, in. [illegible]
Capacitance Gage Reading: 408 412 405

Bluing Pin Rollout

75%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	0	0	0	0	0	0	0	0
#2	0	0	0	0	0	0	0	0
#3	0	0	0	0	0	0	0	0
#4	0	0	0	0	0	0	0	0
#5								

EFFECTS OF HOLE QUALITY

Test Series 7 Quality Variable PERPENDICULARITY DEVIATION - 3° MAX. INTERFERENCE

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.715

Modify Good Holes Using Following Conditions:
Tool: UNDERSIZE OMARK DRILL REAMER
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.810
Procedure: SET HEAD ANGLE 3° IN TRANSVERSE DIRECTION, SCRIBE HOLE LOCATION, POSITION TABLE IN TRANSVERSE DIRECTION USING CENTERING MICROSCOPE IN SPINDLE — DRILL & REAM HOLE SHALLOW BY .060" THEN C'SINK WITH UNDERSIZE DRILL-REAMER

Results: Specimen No. 4E1B Hole #1
Surface Finish, AA 24
Protrusion, in. .238
Perpendicularity, .001 in./gage length
Longitudinal 0 Transverse .052
Flush Gage Reading, in. .028
Capacitance Gage Reading: 330 390 360

Bluing Pin Rollout 75%

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
	Angular Position							
Bottom #1	0	0	0	0	0	0	0	0
FAY → #2	+0.5	0	0	0	0	+1	+1	+1
#3	0	0	0	0	0	0	0	0
#4	0	0	0	0	0	0	0	0
#5	OPEN							

Hole #2
Surface Finish, AA 15
Protrusion, in. .21
Perpendicularity, .001 in./gage length
Longitudinal 0 Transverse .057
Flush Gage Reading, in. .028
Capacitance Gage Reading: 370 420 400

Bluing Pin Rollout 70%

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
	Angular Position							
Bottom #1	0	0	0	0	0	0	0	0
FAY → #2	0	0	0	0	0	0	0	0
#3	0	0	0	0	0	0	0	0
#4	0	0	0	0	0	0	0	0
#5	OPEN							[illegible]

EFFECTS OF HOLE QUALITY

Test Series 7 Quality Variable *PERPENDICULARITY DEVIATION - 3°*
MAX. INTERFERENCE

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm *325* Feed: *HAND - 0.5 IPM*
Cutting Fluid: *STODDARD SOLVENT* Depth: (Ind. Reading) *1.715*

Modify Good Holes Using Following Conditions:
Tool: *UNDERSIZE OMARK DRILL REAMER*
Spindle, rpm *325* Feed: *HAND - 0.5 IPM*
Cutting Fluid: *STODDARD SOLVENT* Depth: (Ind. Reading) *1.510*
Procedure: *SET HEAD ANGLE 3° IN TRANSVERSE DIRECTION, SCRIBE HOLE LOCATION, POSITION TABLE IN TRANSVERSE DIRECTION USING CENTERING MICROSCOPE IN SPINDLE — DRILL & REAM HOLE SHALLOW BY .060" THEN C'SINK WITH UNDERSIZE DRILL-REAMER*

Results: Specimen No. *5C3P* Hole #1
Surface Finish, AA *36*
Protrusion, in. *.266*
Perpendicularity, .001 in./gage length
Longitudinal *.002/inch* Transverse *.[illegible]/inch*
Flush Gage Reading, in. *.030* *324*
Capacitance Gage Reading: *365* *410*

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	0	0	0	0	0	0	0	0
#2	+0.5	0	0	0	0	+1	+1	+1
#3	0	0	0	0	0	0	0	0
#4	0	0	0	0	0	0	0	0
#5								

FAY → #2

Hole #2

Surface Finish, AA *28*
Protrusion, in. *.279*
Perpendicularity, .001 in./gage length
Longitudinal *0* Transverse *.05[illegible]/inch*
Flush Gage Reading, in. *.033* *366*
Capacitance Gage Reading: *372* *378*

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	0	0	0	0	0	0	0	0
#2	0	0	0	0	0	0	0	0
#3	0	0	0	0	0	0	0	0
#4	0	0	0	0	0	0	0	0
#5								

EFFECTS OF HOLE QUALITY

Test Series 7 Quality Variable PERPENDICULARITY DEVIATION - 3°
MAX. INTERFERENCE

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.715

Modify Good Holes Using Following Conditions:
Tool: UNDERSIZE OMARK DRILL REAMER
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.810
Procedure: SET HEAD ANGLE 3° IN TRANSVERSE DIRECTION, SCRIBE HOLE LOCATION, POSITION TABLE IN TRANSVERSE DIRECTION USING CENTERING MICROSCOPE IN SPINDLE — DRILL & REAM HOLE SHALLOW BY .060" THEN C'SINK WITH UNDERSIZE DRILL-REAMER

Results: Specimen No. 5CGCT Hole #1
Surface Finish, AA 22
Protrusion, in. .242
Perpendicularity, .001 in./gage length
Longitudinal .005/INCH Transverse .054/INCH
Flush Gage Reading, in. .029
Capacitance Gage Reading: 381 424 430

Bluing Pin Rollout
70%

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
	Angular Position							
Bottom #1	0	0	0	0	0	0	0	0
#2	0	0	0	0	0	0	0	0
#3	0	0	0	0	0	0	0	0
#4	0	0	0	0	0	0	0	0
#5								

Hole #2
Surface Finish, AA 35
Protrusion, in. .250
Perpendicularity, .001 in./gage length
Longitudinal .003/INCH Transverse .052/INCH
Flush Gage Reading, in. .029
Capacitance Gage Reading: 510 374 388

Bluing Pin Rollout
30%

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
	Angular Position							
Bottom #1	0	0	0	0	0	0	0	0
#2	0	0	0	0	0	0	0	0
#3	0	0	0	0	0	0	0	0
#4	0	0	0	0	0	0	0	0
#5								

9/1/[illegible]

EFFECTS OF HOLE QUALITY

Test Series 7 Quality Variable PERPENDICULARITY DEVIATION - 3° MAX. INTERFERENCE

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.715

Modify Good Holes Using Following Conditions:
Tool: UNDERSIZE OMARK DRILL REAMER
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.510
Procedure: SET HEAD ANGLE 3° IN TRANSVERSE DIRECTION, SCRIBE HOLE LOCATION, POSITION TABLE IN TRANSVERSE DIRECTION USING CENTERING MICROSCOPE IN SPINDLE - DRILL & REAM HOLE SHALLOW BY .060" THEN C'SINK WITH UNDERSIZE DRILL-REAMER

Results: Specimen No. 5C4 C7 Hole #1

Surface Finish, AA 25
Protrusion, in. .[illegible]7
Perpendicularity, .001 in./gage length
Longitudinal .003/inch Transverse .037/inch
Flush Gage Reading, in. .030
Capacitance Gage Reading: 450 372 416

Bluing Pin Rollout
80%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	0	0	0	0	0	[illegible]	0	0
#2	0	0	0	0	0	0	0	0
#3	0	0	0	0	0	0	0	0
#4	0	0	0	0	0	0	0	0
#5								

Hole #2

Surface Finish, AA 30
Protrusion, in. .245
Perpendicularity, .001 in./gage length
Longitudinal .004/inch Transverse .056/inch
Flush Gage Reading, in. .030
Capacitance Gage Reading: 485 390 447

Bluing Pin Rollout
80%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	0	0	0	0	0	0	0	0
#2	0	0	0	0	0	0	0	0
#3	0	0	0	0	0	0	0	0
#4	0	0	0	0	0	0	0	0
#5								

9/[illegible]

EFFECTS OF HOLE QUALITY

Test Series **7** Quality Variable *PERPENDICULARITY DEVIATION - 3° MAX. INTERFERENCE*

Produce Good Hole Using Following Conditions:

Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)

Spindle, rpm *325* Feed: *HAND - 0.5 IPM*

Cutting Fluid: *STODDARD SOLVENT* Depth: (Ind. Reading) *1.715*

ZERO @ .100

Modify Good Holes Using Following Conditions:

Tool: *UNDERSIZE OMARK DRILL REAMER*

Spindle, rpm *325* Feed: *HAND - 0.5 IPM*

Cutting Fluid: *STODDARD SOLVENT* Depth: (Ind. Reading) *1.810* (ZERO @ .100)

Procedure: *SET HEAD ANGLE 3° IN TRANSVERSE DIRECTION, SCRIBE HOLE LOCATION, POSITION TABLE IN TRANSVERSE DIRECTION USING CENTERING MICROSCOPE IN SPINDLE - DRILL & REAM HOLE SHALLOW BY .060" THEN CO'SINK WITH UNDERSIZE DRILL-REAMER*

Results: Specimen No. *4C5B* **Hole #1**

Surface Finish, AA *34*

Protrusion, in. *.232*

Perpendicularity, .001 in./gage length

Longitudinal *.002/INCH* Transverse *.055/INCH*

Flush Gage Reading, in. *.025*

Capacitance Gage Reading: *309* *305* *333*

Bluing Pin Rollout *70%*

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
	Angular Position							
Bottom #1	0	0	0	0	0	0	0	0
FAY — #2	0	0	0	0	0	0	0	0
#3	0	0	0	0	0	0	0	0
#4	0	0	0	0	0	0	0	0
#5								

Hole #2

Surface Finish, AA *35*

Protrusion, in. *.240*

Perpendicularity, .001 in./gage length

Longitudinal *.001/INCH* Transverse *.054/INCH*

Flush Gage Reading, in. *.026*

Capacitance Gage Reading: *327* *322* *227*

Bluing Pin Rollout *70%*

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
	Angular Position							
Bottom #1	0	0	0	0	0	0	0	0
FAY — #2	0	0	0					0
#3	0	0	0	0	0		0	0
#4	0	0	0	0	0	0	0	0
#5								

EFFECTS OF HOLE QUALITY

Test Series 7 Quality Variable PERPENDICULARITY DEVIATION - 3°
MAX. INTERFERENCE

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.7[illegible]

Modify Good Holes Using Following Conditions:
Tool: UNDERSIZE OMARK DRILL REAMER
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.810
Procedure: SET HEAD ANGLE 3° IN TRANSVERSE DIRECTION, SCRIBE HOLE LOCATION, POSITION TABLE IN TRANSVERSE DIRECTION USING CENTERING MICROSCOPE IN SPINDLE - DRILL & REAM HOLE SHALLOW BY .060" THEN C'SINK WITH UNDERSIZE DRILL-REAMER

Results: Specimen No. 5A/CT Hole #1

Surface Finish, AA 36
Protrusion, in. .255
Perpendicularity, .001 in./gage length
Longitudinal .004/INCH Transverse .053/INCH
Flush Gage Reading, in. .030 318
Capacitance Gage Reading: 301 317

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1		0	0	0	0	0	0	0
#2	0	0	+0.5	+0.5	0	0	0	0
#3	0	0	0	0	0	0	0	0
#4	0	0	0	0	0	0	0	0
#5								

FA1

Hole #2

Surface Finish, AA 52
Protrusion, in. .279
Perpendicularity, .001 in./gage length
Longitudinal .004 IN. Transverse .05[illegible] IN.
Flush Gage Reading, in. .029 380
Capacitance Gage Reading: 54[illegible] 420

Bluing Pin Rollout

80%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	0	0	0	0	0	0	0	0
#2	0	0	0	0	0	+0.5	+0.5	0
#3	0	0	0	0	0	0	0	0
#4	0	0	0	0	0	0	0	0
#5								

FAY

4/[illegible]

INSPECTION SHEETS FOR TEST SERIES 8 - BARRELLING

MANUFACTURING REPORT: TAPERED HOLES

Test Series 8 Quality Variable HOLE BARRELLING (.0023) MIN. INTERFERENCE
Specimen No. 402T

Hole Manufacturing Conditions and Procedures: TAPER REAM WITH GROUP II REAMER, FEED BORING BAR INTO HOLE (100) AND TOUCH ON DIA. BORE HOLE TO DEPTH OF .585" NOSE RADIUS = 1/8"

Spindle, rpm 660 Feed: .0015 IPR
Cutting Fluid: DRY Depth: (Ind. Reading) 1.160

Hole #1

Surface Finish, AA 55
Protrusion, in. .126
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse 0
Flush Gage Reading, in. .0
Capacitance Gage Reading .257
Exit Burr Height, in.

Bluing Pin Rollout

20%

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	9.0	8.0	8.0	6.0	11.0	11.0	13.0
#2	9.0	7.0	6.0	4.0	13.0	14.5	15.0
#3	4.0	6.0	6.0	4.0	9.0	5.0	11.0
#4	-2.0	1.5	3.0	-8.0	6.0	5.0	8.0
#5	-2.0	-1.0	1.5	-3.0	8.0	14.5	14.0

Hole #2

Surface Finish, AA 55
Protrusion, in. .117
Perpendicularity, .001 in./in.
Longitudinal .002 Transverse .003
Flush Gage Reading, in. .0
Capacitance Gage Reading .237
Exit Burr Height, in.

Bluing Pin Rollout

25%

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	13.0	13.0	13.0	11.5	12.0	13.0	13.0
#2	14.0	14.0	14.0	14.0	14.0	14.0	14.0
#3	10.0	14.0	13.0	11.5	8.0	5.0	7.0
#4	9.0	11.0	11.5	9.0	6.0	3.0	5.0
#5	10.0	10.0	10.0	10.5	11.0	9.0	8.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 8 Quality Variable HOLE BARRELLING (.0023)
Specimen No. 3A6B MIN. INTERFERENCE

Hole Manufacturing Conditions and Procedures: TAPER REAM WITH GROUP II REAMER, FEED BORING BAR INTO HOLE (.100) AND TOUCH ON DIA. BORE HOLE TO DEPTH OF .585" NOSE RADIUS = 1/8"

Spindle, rpm 660 Feed: .0015 IPR
Cutting Fluid: DRY Depth: (Ind. Reading) 1.160

Hole #1

Surface Finish, AA 60
Protrusion, in. .121
Perpendicularity, .001 in./in.
Longitudinal .002 Transverse .002
Flush Gage Reading, in. .0
Capacitance Gage Reading .246
Exit Burr Height, in.

Bluing Pin Rollout

30%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	12.0	11.5	11.0	10.0	10.0	11.0	11.0
#2	12.0	11.0	11.0	9.5	10.0	11.0	11.0
#3	10.0	7.5	7.0	5.0	4.0	8.0	9.0
#4	8.0	4.0	2.0	2.0	4.0	5.0	7.0
#5	9.0	3.0	3.0	3.0	6.0	6.0	8.0

Hole #2

Surface Finish, AA 50
Protrusion, in. .106
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse .002
Flush Gage Reading, in. .0
Capacitance Gage Reading .304
Exit Burr Height, in.

Bluing Pin Rollout

30%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	11.0	10.0	11.0	10.0	10.0	11.0	11.0
#2	10.0	10.0	10.0	10.0	10.0	10.0	10.0
#3	6.0	6.0	5.0	6.0	5.0	6.0	6.0
#4	.0	2.0	1.0	3.0	1.0	1.5	2.0
#5	.0	3.0	3.5	4.0	2.5	.0	3.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 8 Quality Variable HOLE BARRELLING (.0023)
Specimen No. 2CST MIN INTERFERENCE

Hole Manufacturing Conditions and Procedures: TAPER REAM WITH GROUP II REAMER, FEED BORING BAR INTO HOLE (.100) AND TOUCH ON DIA. BORE HOLE TO DEPTH OF .585" NOSE RADIUS = 1/8"

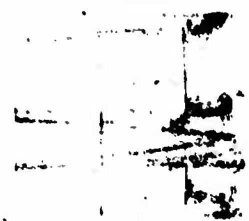
Spindle, rpm 660 Feed: .0015 IPR
Cutting Fluid: DRY Depth: (Ind. Reading) 1.160

Hole #1

Surface Finish, AA 45
Protrusion, in. .126
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .0015
Flush Gage Reading, in. .0
Capacitance Gage Reading .204
Exit Burr Height, in.

Bluing Pin Rollout

25%



Air Gage Readings (.0001 in.)

Angular Position

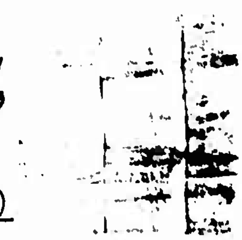
Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	12.0	11.0	12.0	10.0	9.0	10.0	11.5
#2	12.0	12.0	11.5	9.0	7.5	10.0	11.0
#3	9.5	10.5	10.0	6.0	4.0	8.5	9.5
#4	12.0	8.5	7.0	2.5	4.0	6.0	7.5
#5	12.0	14.0	13.0	13.0	14.0	13.0	14.0

Hole #2

Surface Finish, AA 50
Protrusion, in. .125
Perpendicularity, .001 in./in.
Longitudinal .0015 Transverse .002
Flush Gage Reading, in. .0
Capacitance Gage Reading .204
Exit Burr Height, in.

Bluing Pin Rollout

25%



Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	11.0	11.0	12.5	10.0	13.0	11.0	11.0
#2	11.5	11.0	12.5	10.0	13.0	10.5	10.5
#3	10.0	10.0	13.0	7.5	11.0	8.5	9.0
#4	8.5	7.5	9.0	4.5	8.0	6.5	6.5
#5	15.0	15.0	—	8.5	15.0	13.0	11.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 8 Quality Variable HOLE BARRELLING (.0023)
Specimen No. 3D2B MIN. INTERFERENCE

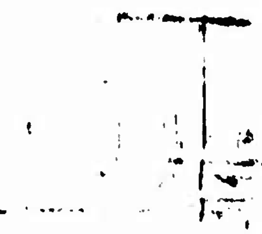
Hole Manufacturing Conditions and Procedures: TAPER REAM WITH GROUP II REAMER, FEED BORING BAR INTO HOLE (.100) AND TOUCH ON DIA. BORE HOLE TO DEPTH OF .585" NOSE RADIUS = 1/8"

Spindle, rpm 660 Feed: .0015 IPR
Cutting Fluid: DRY Depth: (Ind. Reading) 1.160

Hole #1

Surface Finish, AA 65
Protrusion, in. .121
Perpendicularity, .001 in./in.
Longitudinal .0025 Transverse .0015
Flush Gage Reading, in. .0
Capacitance Gage Reading .221
Exit Burr Height, in.

Bluing Pin Rollout



30%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	4.5	4.0	4.0	3.0	3.0	3.0	5.0
#2	5.5	5.0	5.0	5.0	5.0	5.0	6.5
#3	5.0	4.0	4.0	1.5	3.0	3.0	6.0
#4	3.0	1.5	1.0	-3.0	-.5	-.5	2.5
#5	8.0	7.5	7.0	5.0	7.0	5.0	6.0

Hole #2

Surface Finish, AA 55
Protrusion, in. .122
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse .001
Flush Gage Reading, in. .002
Capacitance Gage Reading .243
Exit Burr Height, in.

Bluing Pin Rollout

30%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	4.0	3.5	3.0	4.0	3.5	3.0	3.5
#2	5.5	5.0	5.0	7.0	4.5	5.0	5.0
#3	3.5	1.5	1.5	4.0	1.0	2.5	3.0
#4	-.5	-3.0	-3.0	1.0	-4.0	-1.5	-3.0
#5	5.0	3.0	2.0	7.0	3.5	5.0	4.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 8 Quality Variable HOLE BARRELLING (.0023)
Specimen No. 3H1T MIN. INTERFERENCE

Hole Manufacturing Conditions and Procedures: TAPER REAM WITH GROUP II REAMER, FEED BORING BAR INTO HOLE (100) AND TOUCH ON DIA. BORE HOLE TO DEPTH OF .585" NOSE RADIUS = 1/8"

Spindle, rpm 660 Feed: .0015 IPR
Cutting Fluid: DRY Depth: (Ind. Reading) 1.160

Hole #1

Surface Finish, AA 65
Protrusion, in. .119
Perpendicularity, .001 in./in.
Longitudinal .0 Transverse .0
Flush Gage Reading, in. .001
Capacitance Gage Reading .193
Exit Burr Height, in.

Bluing Pin Rollout

20°/8

Air Gage Readings (.0001 in.)
Angular Position

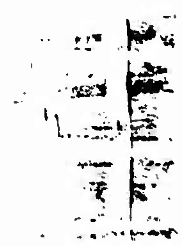
Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	12.0	12.0	14.0	10.0	11.0	12.0	12.0
#2	12.0	11.0	13.0	9.0	10.0	11.0	12.0
#3	12.5	11.0	12.0	6.0	8.0	11.0	11.5
#4	10.0	9.0	6.0	7.0	6.0	8.0	9.0
#5	—	—	—	14.0	14.0	—	—

Hole #2

Surface Finish, AA 45
Protrusion, in. .112
Perpendicularity, .001 in./in.
Longitudinal .0015 Transverse .002
Flush Gage Reading, in. .002
Capacitance Gage Reading .232
Exit Burr Height, in.

Bluing Pin Rollout

25°/1



Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	11.0	11.0	12.0	11.0	11.0	13.0	13.0
#2	11.0	11.0	11.0	10.0	10.0	13.0	13.0
#3	9.0	9.0	9.0	7.0	7.0	10.0	11.0
#4	6.0	5.0	5.0	3.0	4.0	7.0	7.0
#5	6.0	.5	1.5	-1.0	3.5	3.0	3.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 8 Quality Variable HOLE BARRELLING (.0023)
Specimen No. 2A6T MIN. INTERFERENCE

Hole Manufacturing Conditions and Procedures: TAPER REAM WITH GROUP II REAMER, FEED BORING BAR INTO HOLE (.100) AND TOUCH ON DIA. BORE HOLE TO DEPTH OF .585" NOSE RADIUS = 1/8"

Spindle, rpm 660 Feed: .0015 IPR

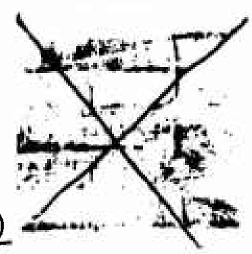
Cutting Fluid: DRY Depth: (Ind. Reading) 1.160

Hole #1

Surface Finish, AA 50
Protrusion, in. .124
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .001
Flush Gage Reading, in. .0
Capacitance Gage Reading .222
Exit Burr Height, in.

Bluing Pin Rollout

25%



Air Gage Readings (.0001 in.)
Angular Position

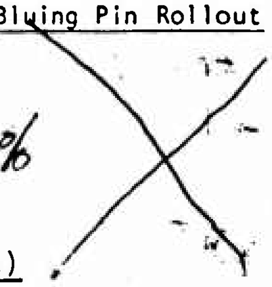
Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	5.0	5.0	6.5	2.5	4.5	4.0	4.5
#2	5.0	5.0	7.0	3.0	5.0	5.0	5.0
#3	3.0	2.5	3.5	.0	1.5	2.0	4.5
#4	.0	-2.0	1.5	-3.5	-1.0	-3.0	1.0
#5	8.0	8.0	10.0	7.0	7.0	5.0	6.0

Hole #2

Surface Finish, AA 60
Protrusion, in. .124
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .004
Flush Gage Reading, in. .0015
Capacitance Gage Reading .260
Exit Burr Height, in.

Bluing Pin Rollout

30%



Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	2.0	4.0	4.0	3.5	4.0	3.5	3.0
#2	4.5	5.0	5.0	5.0	5.0	5.0	5.0
#3	2.0	2.0	2.0	2.5	3.5	4.0	3.5
#4	-2.0	-3.0	-2.0	1.0	.0	.0	.0
#5	1.0	-4.0	-2.5	.5	2.0	1.0	.5

MANUFACTURING REPORT: TAPERED HOLES

Test Series 8 Quality Variable HOLE BARRELLING (.0023)
Specimen No. 2D4T MIN. INTERFERENCE

Hole Manufacturing Conditions and Procedures: TAPER REAM WITH GROUP II REAMER, FEED BORING BAR INTO HOLE (.190) AND TOUCH ON DIA. BORE HOLE TO DEPTH OF .585" NOSE RADIUS = 1/8"

Spindle, rpm 660 Feed: .0015 IPR
Cutting Fluid: DRY Depth: (Ind. Reading) 1.160

Hole #1

Surface Finish, AA 55
Protrusion, in. .122
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse 0
Flush Gage Reading, in. 0
Capacitance Gage Reading .204
Exit Burr Height, in.

Bluing Pin Rollout

30%

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	12.0	11.5	11.0	11.0	11.0	14.0	11.0
#2	11.0	11.0	10.0	10.0	10.0	13.0	10.5
#3	9.0	8.0	5.0	7.0	7.0	10.0	7.0
#4	7.0	5.0	3.0	8.0	3.0	8.0	4.5
#5	15.0	13.0	7.0	14.0	14.0	—	13.0

Hole #2

Surface Finish, AA 50
Protrusion, in. .109
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse 0
Flush Gage Reading, in. .0
Capacitance Gage Reading .246
Exit Burr Height, in.

Bluing Pin Rollout

20%

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	12.0	12.0	12.0	10.5	10.0	10.5	11.0
#2	11.0	11.5	11.0	10.0	10.0	10.5	11.0
#3	7.0	9.0	8.0	6.0	5.0	7.0	7.0
#4	2.5	4.5	4.0	6.0	2.0	2.0	2.0
#5	4.0	3.0	5.0	3.0	1.0	3.0	6.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 8 Quality Variable HOLE BARRELLING (.0023) MIN. INTERFERENCE
Specimen No. 5A6CB

Hole Manufacturing Conditions and Procedures: TAPER REAM WITH GROUP II REAMER, FEED BORING BAR INTO HOLE (.190) AND TOUCH ON DIA. BORE HOLE TO DEPTH OF .585" NOSE RADIUS: 1/8"

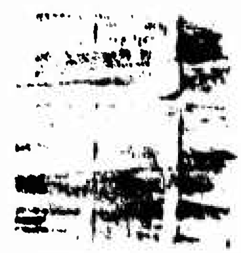
Spindle, rpm 660 Feed: .0015 IPR
Cutting Fluid: DRY Depth: (Ind. Reading) 1.160

Hole #1

Surface Finish, AA 50
Protrusion, in. .115
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .001
Flush Gage Reading, in. -0
Capacitance Gage Reading .196
Exit Burr Height, in.

Bluing Pin Rollout

25%



Air Gage Readings (.0001 in.)
Angular Position

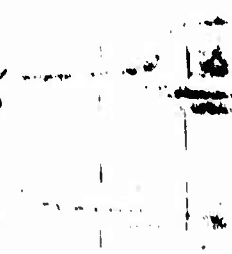
Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	14.0	11.0	10.0	11.0	12.0	11.0	11.0
#2	14.0	11.0	9.0	9.0	11.0	11.0	10.0
#3	13.0	9.0	5.0	5.0	6.0	9.0	9.0
#4	11.0	6.0	3.0	3.0	7.0	6.0	6.0
#5	—	14.0	4.0	14.0	13.0	14.0	12.0

Hole #2

Surface Finish, AA 65
Protrusion, in. .119
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .0015
Flush Gage Reading, in. .002
Capacitance Gage Reading .215
Exit Burr Height, in.

Bluing Pin Rollout

25%



Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	11.0	11.0	11.0	9.0	12.0	12.0	10.0
#2	11.0	11.0	11.0	9.0	12.0	13.0	10.0
#3	9.0	9.0	7.0	7.0	9.0	10.0	8.0
#4	7.0	7.0	4.0	6.0	7.0	8.0	6.0
#5	14.0	—	14.0	13.0	—	—	13.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 8 Quality Variable HOLE BARRELLING (.0023)
Specimen No. 2C4T MIN. INTERFERENCE

Hole Manufacturing Conditions and Procedures: TAPER REAM WITH GROUP II REAMER, FEED BORING BAR INTO HOLE (190) AND TOUCH ON DIA. BORE HOLE TO DEPTH OF .585" NOSE RADIUS = 1/8"

Spindle, rpm 660 Feed: .0015 IPR
Cutting Fluid: DRY Depth: (Ind. Reading) 1.160

Hole #1

Surface Finish, AA 60
Protrusion, in. .119
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse 0
Flush Gage Reading, in. .001
Capacitance Gage Reading .187
Exit Burr Height, in.

20%

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

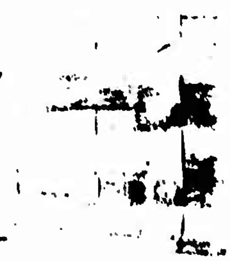
Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	12.0	14.0	13.0	13.0	11.0	12.0	12.0
#2	12.0	14.0	13.0	12.0	10.0	11.0	12.0
#3	10.5	13.0	11.0	11.0	7.0	10.0	11.0
#4	8.0	11.0	9.0	11.0	9.0	8.0	9.0
#5	15.0	—	—	—	—	14.0	—

Hole #2

Surface Finish, AA 60
Protrusion, in. .120
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .0015
Flush Gage Reading, in. .001
Capacitance Gage Reading .202
Exit Burr Height, in.

20%

Bluing Pin Rollout



Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	13.0	14.0	12.0	11.0	10.0	10.0	12.0
#2	11.0	13.0	11.0	10.0	8.0	10.0	11.0
#3	8.5	11.0	8.0	8.0	4.0	8.0	9.0
#4	5.0	8.0	6.0	6.0	3.0	5.0	7.0
#5	13.0	—	15.0	15.0	13.0	14.0	15.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 8 Quality Variable HOLE BARRELLING (.0023) MIN. INTERFERENCE
Specimen No. 5C2CT

Hole Manufacturing Conditions and Procedures: TAPER REAM WITH GROUP II REAMER, FEED BORING BAR INTO HOLE (.190) AND TOUCH ON DIA. BORE HOLE TO DEPTH OF .585" NOSE RADIUS = 1/8"

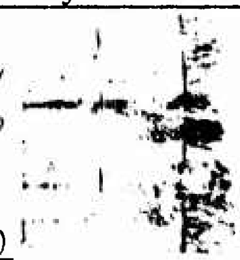
Spindle, rpm 660 Feed: .0015 IPR
Cutting Fluid: DRY Depth: (Ind. Reading) 1.160

Hole #1

Surface Finish, AA 55
Protrusion, in. .112
Perpendicularity, .001 in./in.
Longitudinal .0015 Transverse .001
Flush Gage Reading, in. .002
Capacitance Gage Reading .228
Exit Burr Height, in.

Bluing Pin Rollout

30%



Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	12.5	12.5	12.0	10.0	10.0	11.0	12.0
#2	12.0	11.5	12.0	8.5	9.5	10.0	12.0
#3	10.0	9.0	8.0	2.0	7.0	5.0	9.0
#4	8.5	6.5	6.0	0	6.0	4.0	7.0
#5	15.0	—	—	14.0	14.0	13.0	13.5

Hole #2

Surface Finish, AA 50
Protrusion, in. .120
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .0025
Flush Gage Reading, in. .001
Capacitance Gage Reading .177
Exit Burr Height, in.

Bluing Pin Rollout

20%

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	11.0	13.0	12.0	11.0	10.0	12.0	12.0
#2	12.5	13.0	13.0	11.0	9.0	12.0	12.0
#3	12.0	12.5	12.0	9.5	5.0	10.5	11.0
#4	10.5	11.0	10.5	7.0	1.5	9.0	9.0
#5	—	—	15.0	15.0	13.0	—	15.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 8 Quality Variable HOLE BARRELLING (.0048) MAX INTERFERENCE

Specimen No. 5E2CT

Hole Manufacturing Conditions and Procedures: TAPER REAM STD. HOLE FEED BORING BAR INTO HOLE .100", MOVE ECCENTRIC TO TOUCH ON DIA OF HOLE BORE HOLE TO DEPTH OF .585" NOSE RADIUS • 1/8 IN.

Spindle, rpm ~~225~~ 660 Feed: .0015 IPR

Cutting Fluid: DRY Depth: (Ind. Reading) 1.675

Hole #1

Surface Finish, AA 60

Protrusion, in. .243

Perpendicularity, .001 in./in.

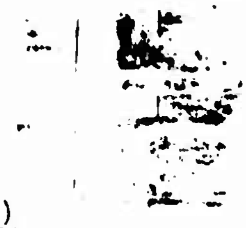
Longitudinal .0015 Transverse .003

Flush Gage Reading, in. .003

Capacitance Gage Reading .235

Exit Burr Height, in.

Bluing Pin Rollout



25%

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	2.0	.5	1.0	2.5	2.5	2.5	2.5
#2	1.5	.5	1.0	2.0	2.5	2.5	2.0
#3	1.0	1.0	1.0	2.0	2.5	2.0	2.0
#4	1.5	3.0	1.0	1.5	3.0	1.5	1.5
#5	3.0	3.5	3.0	3.0	3.5	3.0	3.0

Hole #2

Surface Finish, AA 60

Protrusion, in. .239

Perpendicularity, .001 in./in.

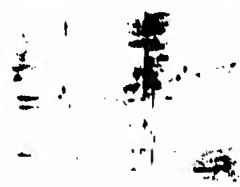
Longitudinal 0 Transverse .002

Flush Gage Reading, in. .002

Capacitance Gage Reading .231

Exit Burr Height, in.

Bluing Pin Rollout



35%

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	2.5	2.5	2.5	2.5	2.5	2.5	2.5
#2	2.0	2.0	2.0	2.0	2.0	2.0	2.0
#3	2.0	1.5	1.5	1.5	1.5	2.0	2.0
#4	1.0	.5	1.0	.5	1.0	1.5	1.0
#5	3.5	3.5	3.5	3.5	3.0	3.5	3.5

MANUFACTURING REPORT: TAPERED HOLES

Test Series 8 Quality Variable HOLE BARRELLING (.0048) MAX INTERFERENCE
Specimen No. 5B2CT

Hole Manufacturing Conditions and Procedures: TAPER REAM STD. HOLE FEED BORING BAR INTO HOLE .100", MOVE ECCENTRIC TO TOUCH ON DIA OF HOLE BORE HOLE TO DEPTH OF .585" NOSE RADIUS .1/8 IN.

Spindle, rpm ~~325~~ 660 Feed: .0015 IPR
Cutting Fluid: DRY Depth: (Ind. Reading) 1.675

Hole #1

Surface Finish, AA 50
Protrusion, in. .235
Perpendicularity, .001 in./in.
Longitudinal .0005 Transverse .001
Flush Gage Reading, in. .002
Capacitance Gage Reading .227
Exit Burr Height, in.

Bluing Pin Rollout

20%

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	180°	225°	270°	315°
	Angular Position						
Bottom #1	2.5	2.5	2.0	2.0	2.0	2.0	2.0
#2	2.0	2.0	2.0	1.5	1.5	1.5	2.0
#3	1.5	1.5	1.5	.5	1.0	1.0	1.5
#4	1.0	1.0	1.0	.5	.5	1.0	1.0
#5	3.0	3.0	3.0	3.0	3.0	3.0	3.0

Hole #2

Surface Finish, AA 65
Protrusion, in. .233
Perpendicularity, .001 in./in.
Longitudinal .0005 Transverse .002
Flush Gage Reading, in. 0
Capacitance Gage Reading .265
Exit Burr Height, in.

Bluing Pin Rollout

30%

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	180°	225°	270°	315°
	Angular Position						
Bottom #1	2.5	2.5	2.0	2.0	2.0	2.5	2.5
#2	2.0	2.0	1.5	1.5	1.5	2.0	2.0
#3	1.5	1.5	1.0	1.0	1.5	2.0	2.0
#4	.5	.5	1.0	0	0	1.0	1.0
#5	3.0	3.0	3.0	3.0	3.5	3.0	3.5

MANUFACTURING REPORT: TAPERED HOLES

Test Series 8 Quality Variable Hole Barrelling (.0048)
Specimen No. 5B1CB Max Interference

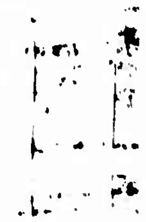
Hole Manufacturing Conditions and Procedures: Taper Ream Std. Hole
Feed Boring Bar Into Hole .100", Move Eccentric To Touch
on Dia of Hole Bore Hole To Depth of .585" Nose Radius = 1/8 in.
Spindle, rpm ~~325~~ 660 Feed: .0015 IPR
Cutting Fluid: DRY Depth: (Ind. Reading) 1.675

Hole #1

Surface Finish, AA 50
Protrusion, in. .235
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse 001
Flush Gage Reading, in. 0
Capacitance Gage Reading 218
Exit Burr Height, in.

Bluing Pin Rollout

20%



Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	3.5	3.5	3	2.5	2.5	3	3.5
#2	3	3	3	2	2	3	3
#3	3	3	2.5	1.5	1.5	2.5	3
#4	2.5	2.5	2	1	1	2	2.5
#5	2	2	1.5	1.5	1.5	1.5	2

Hole #2

Surface Finish, AA 55
Protrusion, in. .210
Perpendicularity, .001 in./in.
Longitudinal .003 Transverse .001
Flush Gage Reading, in. 0
Capacitance Gage Reading 246
Exit Burr Height, in.

Bluing Pin Rollout

20%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	3	3	3	3	3	3	3
#2	3	3	3	2.5	2.5	3	3
#3	2.5	2.5	2.5	2	2	2.5	2.5
#4	2	2	2	1.5	1.5	2	2
#5	1	1	1	1	1	1	1.5

MANUFACTURING REPORT: TAPERED HOLES

Test Series 8 Quality Variable HOLE BARRELLING (.0048)
Specimen No. 5ESC8 MAX INTERFERENCE

Hole Manufacturing Conditions and Procedures: TAPER REAM STD. HOLE FEED BORING BAR INTO HOLE .100", MOVE ECCENTRIC TO TOUCH ON DIA OF HOLE BORE HOLE TO DEPTH OF .585" NOSE RADIUS = 1/8 IN.

Spindle, rpm ~~825~~ 660 Feed: .0015 IPR
Cutting Fluid: DRY Depth: (Ind. Reading) 1.675

Hole #1

Surface Finish, AA 60
Protrusion, in. .218
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse .002
Flush Gage Reading, in. .002
Capacitance Gage Reading 263
Exit Burr Height, in. ______

Bluing Pin Rollout

25%

Air Gage Readings (.0001 in.)
Angular Position

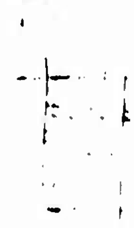
Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	2.5	2	2.5	3.5	3.5	3.5	3.5
#2	2	1.5	2	3	3.5	3	2.5
#3	1.5	1	1	3	3	2.5	2.5
#4	1	1	1	2.5	2.5	2	2
#5	1.5	1.5	1.5	1.5	2	2	1

Hole #2

Surface Finish, AA 65
Protrusion, in. .238
Perpendicularity, .001 in./in.
Longitudinal .0005 Transverse 0
Flush Gage Reading, in. .002
Capacitance Gage Reading 252
Exit Burr Height, in. ______

Bluing Pin Rollout

20%



Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	3.5	3	3	3	3	3	3
#2	3	2.5	2.5	2.5	2.5	3	2.5
#3	2.5	2	2	2	2	2.5	2.5
#4	2	1.5	1.5	1.5	1.5	2	2
#5	4	3.5	3.5	4	3.5	4	3.5

MANUFACTURING REPORT: TAPERED HOLES

Test Series 8 Quality Variable HOLE BARRELLING (.0048)
Specimen No. 5E2CB MAX INTERFERENCE

Hole Manufacturing Conditions and Procedures: TAPER REAM STD. HOLE FEED BORING BAR INTO HOLE .100", MOVE ECCENTRIC TO TOUCH ON DIA OF HOLE. BORE HOLE TO DEPTH OF .585" NOSE RADIUS = 1/8 IN.

Spindle, rpm ~~225~~ 660 Feed: .0015 IPR
Cutting Fluid: DRY Depth: (Ind. Reading) 1.675

Hole #1

✓ Surface Finish, AA 60
✓ Protrusion, in. .239
✓ Perpendicularity, .001 in./in.
Longitudinal .0015 Transverse .0035
✓ Flush Gage Reading, in. +.0005
Capacitance Gage Reading 234
Exit Burr Height, in.

Bluing Pin Rollout

25%

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	1.5	0	.5	2.5	3	3	2.5
#2	1	.5	0	2.5	2.5	2.5	2.5
#3	0	1.5	1	2	2.5	2.5	2
#4	.5	2	1.5	2	2.5	2.5	1.5
#5	2	2.5	2.5	2	2.5	2.5	2

Hole #2

Surface Finish, AA 50
Protrusion, in. .246
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse .0005
Flush Gage Reading, in. +.0015
Capacitance Gage Reading 227
Exit Burr Height, in.

Bluing Pin Rollout

25%

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	2.5	2.5	2.0	2.0	2.5	2.5	2.5
#2	2.0	2.0	1.0	1.5	2.0	2.5	2.5
#3	1.5	2.5	2.0	1.0	-.5	+.5	1.0
#4	1.0	1.0	1.5	0.5	-.5	.0	.5
#5	3.0	3.0	3.0	3.0	3.0	3.0	3.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 8 Quality Variable HOLE BARRELLING (.0040) MAX INTERFERENCE
Specimen No. 2C5B

Hole Manufacturing Conditions and Procedures: TAPER REAM STD. HOLE FEED BORING BAR INTO HOLE .100", MOVE ECCENTRIC TO TOUCH ON DIA OF HOLE, BORE HOLE TO DEPTH OF .585" NOSE RADIUS 1/8 IN.

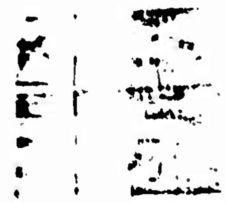
Spindle, rpm ~~225~~ 660 Feed: .0015 IPR
Cutting Fluid: DRY Depth: (Ind. Reading) 1.675

Hole #1

Surface Finish, AA 45
Protrusion, in. .239
Perpendicularity, .001 in./in.
Longitudinal .0015 Transverse .001
Flush Gage Reading, in. .0015
Capacitance Gage Reading .240
Exit Burr Height, in.

Bluing Pin Rollout

35%



Air Gage Readings (.0001 in.)
Angular Position

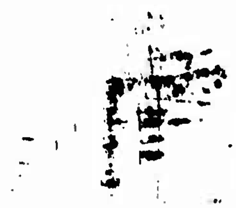
Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	1.5	1.0	1.0	2.5	3.0	2.5	2.0
#2	.5	1.0	1.0	2.0	2.5	2.5	1.5
#3	0	0	1.0	2.0	2.5	2.0	1.5
#4	1.0	0	1.5	1.5	2.5	2.0	1.0
#5	3.0	3.5	3.0	3.0	3.5	3.0	3.0

Hole #2

Surface Finish, AA 55
Protrusion, in. .247
Perpendicularity, .001 in./in.
Longitudinal .0005 Transverse 0
Flush Gage Reading, in. .0025
Capacitance Gage Reading .237
Exit Burr Height, in.

Bluing Pin Rollout

30%



Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	2.5	2.0	2.0	2.5	2.5	2.5	2.5
#2	2.0	2.0	1.5	2.0	2.0	2.0	2.0
#3	1.5	1.0	1.0	1.0	1.5	1.5	1.5
#4	.5	.5	1.0	.5	1.0	1.0	1.0
#5	3.0	3.5	2.5	3.5	3.5	3.5	3.5

MANUFACTURING REPORT: TAPERED HOLES

Test Series 8 Quality Variable Hole Barrelling (.0048)
Specimen No. 203T Max Interference

Hole Manufacturing Conditions and Procedures: Taper Ream Std. Hole Feed Boring Bar Into Hole .100", Move Eccentric To Touch on Dia of Hole Bore Hole To Depth of .585" Nose Radius = 1/8 in.

Spindle, rpm ~~325~~ 660 Feed: .0015 IPR
Cutting Fluid: Dry Depth: (Ind. Reading) 1.675

Hole #1

Surface Finish, AA 50
Protrusion, in. .245
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse 0
Flush Gage Reading, in. .001
Capacitance Gage Reading .219
Exit Burr Height, in.

Bluing Pin Rollout

25%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	2.0	2.0	1.5	1.5	1.5	2.0	2.0
#2	1.5	1.5	1.0	.0	1.0	1.5	1.5
#3	1.5	1.0	1.0	.0	.0	1.0	1.5
#4	1.0	0	.0	.0	.0	.5	1.0
#5	3.0	3.0	3.0	2.5	3.0	2.5	2.5

Hole #2

Surface Finish, AA 50
Protrusion, in. .244
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .002
Flush Gage Reading, in. .001
Capacitance Gage Reading .283
Exit Burr Height, in.

Bluing Pin Rollout

35%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	2.0	2.0	2.0	2.0	2.0	2.0	2.0
#2	1.5	1.5	1.0	1.5	1.5	1.5	1.5
#3	1.0	1.0	1.0	1.0	1.0	1.0	1.5
#4	.5	.0	.0	.0	.0	.5	.5
#5	2.5	2.5	3.0	2.5	2.5	3.0	2.5

MANUFACTURING REPORT: TAPERED HOLES

Test Series 8 Quality Variable HOLE BARRELLING (.0048) MAX INTERFERENCE
Specimen No. 5C3CT

Hole Manufacturing Conditions and Procedures: TAPER REAM STD. HOLE FEED BORING BAR INTO HOLE .100". MOVE ECCENTRIC TO TOUCH ON DIA OF HOLE. BORE HOLE TO DEPTH OF .585" NOSE RADIUS = 1/8 IN.

Spindle, rpm ~~925~~ 660 Feed: .0015 IPR
Cutting Fluid: DRY Depth: (Ind. Reading) 1.675

Hole #1

Surface Finish, AA 60
Protrusion, in. .243
Perpendicularity, .001 in./in.
Longitudinal .0005 Transverse .002
Flush Gage Reading, in. .0025
Capacitance Gage Reading 237
Exit Burr Height, in.

Bluing Pin Rollout

36%

Air Gage Readings (.0001 in.)
Angular Position

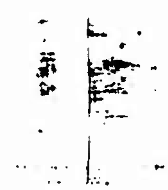
Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	1.5	1.0	1.0	3.0	3.0	3.0	2.0
#2	.5	1.0	0	2.5	2.5	2.5	1.5
#3	0	1.0	0	2.5	2.0	2.0	.5
#4	0	1.5	1.0	2.0	2.0	1.5	0
#5	3.0	3.5	3.0	3.0	3.5	3.0	3.0

Hole #2

Surface Finish, AA 55
Protrusion, in. .246
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse .0015
Flush Gage Reading, in. .001
Capacitance Gage Reading 266
Exit Burr Height, in.

Bluing Pin Rollout

25%



Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	2.5	2.0	2.0	2.0	2.0	2.5	2.0
#2	2.0	2.0	2.0	1.5	1.5	2.0	2.0
#3	1.5	1.0	1.0	1.0	1.0	2.0	1.0
#4	1.0	.5	0	0	1.0	1.0	1.0
#5	3.5	3.5	3.0	3.5	3.5	3.5	3.5

MANUFACTURING REPORT: TAPERED HOLES

Test Series 8 Quality Variable HOLE BARRELLING (.0048)
Specimen No. 5A5C8 MAX INTERFERENCE

Hole Manufacturing Conditions and Procedures: TAPER REAM STD. HOLE FEED BORING BAR INTO HOLE .100". MOVE ECCENTRIC TO TOUCH ON DIA OF HOLE. BORE HOLE TO DEPTH OF .585" NOSE RADIUS = 1/8 IN.

Spindle, rpm ~~325~~ 660 Feed: .0015 IPR

Cutting Fluid: DRY Depth: (Ind. Reading) 1.675

Hole #1

Surface Finish, AA 75

Protrusion, in. .221

Perpendicularity, .001 in./in.

Longitudinal 0 Transverse .001

Flush Gage Reading, in. -.003

Capacitance Gage Reading 237

Exit Burr Height, in.

Bluing Pin Rollout

20%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	3	3	3	3	2.5	3	3
#2	3	2.5	2.5	2	2.5	3	3
#3	2.5	2.5	2.5	2	1.5	1.5	2
#4	2	2	2	2	1	1	1.5
#5	3	3	3	2.5	3.5	3	3

Hole #2

Surface Finish, AA 60

Protrusion, in. .236

Perpendicularity, .001 in./in.

Longitudinal .001 Transverse .0025

Flush Gage Reading, in. .002

Capacitance Gage Reading 257

Exit Burr Height, in.

Bluing Pin Rollout

30%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	3	3	2.5	+2.5	+2.5	3.	3.
#2	2.5	2.5	2	+2	+2.5	2.5	2.5
#3	2.5	2.5	2	+1.5	1.5	2	2
#4	2	2	1.5	+1	.5	1	1
#5	1.5	1	1	1	1	1	1

MANUFACTURING REPORT: TAPERED HOLES

Test Series 8 Quality Variable *Hole Barrelling (.0040) Max Interference*
Specimen No. *4D4T*

Hole Manufacturing Conditions and Procedures: *Taper Ream Std. Hole Feed Boring Bar Into Hole .100", Move Eccentric To Touch on Dia of Hole. Bore Hole To Depth of .585" Nose Radius = 1/8 in.*

Spindle, rpm *660* Feed: *.0015 IPR*
Cutting Fluid: *DRY* Depth: (Ind. Reading) *1.675*

Hole #1

Surface Finish, AA *65*
Protrusion, in. *.238*
Perpendicularity, .001 in./in.
Longitudinal *0* Transverse *0*
Flush Gage Reading, in. *0*
Capacitance Gage Reading *.263*
Exit Burr Height, in.

Bluing Pin Rollout

20%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	180°	225°	270°	315°
Bottom #1	2.0	2.0	2.0	1.5	2.0	2.0	2.0
#2	2.0	1.5	1.5	1.0	1.0	1.0	1.5
#3	1.5	1.5	1.0	.5	.5	1.0	1.5
#4	.5	.5	.0	.0	.0	.0	.5
#5	3.0	2.5	2.5	3.0	3.0	2.5	2.5

Hole #2

Surface Finish, AA *45*
Protrusion, in. *.228*
Perpendicularity, .001 in./in.
Longitudinal *.001* Transverse *.002*
Flush Gage Reading, in. *0*
Capacitance Gage Reading *.293*
Exit Burr Height, in.

Bluing Pin Rollout

25%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	180°	225°	270°	315°
Bottom #1	2.0	2.0	2.0	2.0	2.0	2.0	2.0
#2	2.0	2.0	1.5	1.0	1.0	1.0	1.5
#3	1.5	1.0	1.0	.5	.0	1.0	1.0
#4	1.0	.0	.0	.0	.0	.5	.5
#5	3.0	3.0	2.5	3.0	3.0	3.0	3.0

INSPECTION SHEETS FOR TEST SERIES 8 - BELLMOUTHING

MANUFACTURING REPORT: TAPERED HOLES

Test Series 8 Quality Variable BELL MOUTHING
Specimen No. 2B1B MIN. INTERFERENCE

Hole Manufacturing Conditions and Procedures: PRODUCE STD HOLE BORE EXIT OF HOLE AND CHAMFER ENTRANCE WITH A 60° COUNTERSINK

Spindle, rpm 660 Feed: .0015 IPR
Cutting Fluid: DRY Depth: (Ind. Reading)

Hole #1

Surface Finish, AA 25
Protrusion, in. 118
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .004
Flush Gage Reading, in. .002
Capacitance Gage Reading 262
Exit Burr Height, in.

Bluing Pin Rollout

35%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	7.0	7.0	7.0	8.0	8.0	8.0	7.0
#2	7.0	6.0	6.0	9.0	8.0	7.0	9.0
#3	5.0	2.0	2.0	8.0	3.0	5.0	9.0
#4	5.0	2.0	2.0	9.0	3.0	4.0	7.0
#5	7.0	4.0	4.0	9.0	4.0	2.0	6.0

Hole #2

Surface Finish, AA 55
Protrusion, in. 124
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse .003
Flush Gage Reading, in. .002
Capacitance Gage Reading 220
Exit Burr Height, in.

Bluing Pin Rollout

40%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	8.0	6.0	7.0	6.0	5.0	8.0	9.0
#2	7.0	8.0	8.0	8.0	8.0	8.0	9.0
#3	3.0	8.0	10.0	4.0	8.0	10.0	11.0
#4	0	2.0	8.0	5.0	4.0	6.0	10.0
#5	5.0	2.0	8.0	8.0	0	6.0	[illegible]

MANUFACTURING REPORT: TAPERED HOLES

Test Series 8 Quality Variable BELL MOUTHING
Specimen No. 3C2B MIN. INTERFERENCE

Hole Manufacturing Conditions and Procedures: PRODUCE STD HOLE BORE EXIT OF HOLE AND CHAMFER ENTRANCE WITH A 60° COUNTERSINK

Spindle, rpm 660 Feed: .0015 IPR
Cutting Fluid: DRY Depth: (Ind. Reading)

Hole #1

Surface Finish, AA 50
Protrusion, in. 125
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .002
Flush Gage Reading, in. 0
Capacitance Gage Reading 261
Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	180°	225°	270°	315°
Bottom #1	4.0	5.0	6.0	8.0	6.0	4.0	6.0
#2	5.0	4.0	5.0	8.0	7.0	5.0	9.0
#3	5.0	0	3.0	4.0	4.0	7.0	8.0
#4	4.0	-3.0	-1.0	5.0	2.0	6.0	8.0
#5	7.0	-1.0	-2.0	7.0	1.0	6.0	9.0

Hole #2

Surface Finish, AA 42
Protrusion, in. 124
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .0015
Flush Gage Reading, in. .001
Capacitance Gage Reading 253
Exit Burr Height, in.

45%

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	180°	225°	270°	315°
Bottom #1	6.0	5.0	8.0	6.0	5.0	4.0	7.0
#2	7.0	7.0	6.0	8.0	6.0	5.0	7.0
#3	3.0	9.0	5.0	5.0	8.0	3.0	5.0
#4	-3.0	2.0	4.0	-1.0	8.0	3.0	1.0
#5	-1.0	6.0	6.0	-3.0	6.0	5.0	1.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 8 Quality Variable BELL MOUTHING
Specimen No. 2B5B MIN. INTERFERENCE

Hole Manufacturing Conditions and Procedures: PRODUCE STD HOLE BORE EXIT OF HOLE AND CHAMFER ENTRANCE WITH A 60° COUNTERSINK

Spindle, rpm 660 Feed: .0015 IPR
Cutting Fluid: DRY Depth: (Ind. Reading)

Hole #1

Surface Finish, AA 35
Protrusion, in. 125
Perpendicularity, .001 in./in.
Longitudinal .004 Transverse .004
Flush Gage Reading, in. .002
Capacitance Gage Reading 288
Exit Burr Height, in.

Bluing Pin Rollout

40%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	11.0	10.0	8.0	-5.0	-2.0	8.0	8.0
#2	11.0	11.0	10.0	4.0	2.0	5.0	9.0
#3	3.0	6.0	6.0	8.0	2.0	5.0	1.0
#4	0	1.0	-1.0	6.0	0	5.0	3.0
#5	4.0	3.0	4.0	3.0	0	3.0	4.0

Hole #2

Surface Finish, AA 28
Protrusion, in. 120
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse .004
Flush Gage Reading, in. 0
Capacitance Gage Reading 269
Exit Burr Height, in.

Bluing Pin Rollout

35%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	2.0	3.0	6.0	6.0	5.0	6.0	4.0
#2	4.0	9.0	8.0	9.0	7.0	10.0	6.0
#3	-2.0	8.0	8.0	9.0	0	9.0	4.0
#4	-2.0	5.0	7.0	8.0	1.0	6.0	5.0
#5	-1.0	5.0	6.0	7.0	1.0	4.0	6.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 8 Quality Variable BELL MOUTHING
Specimen No. 3C5B MIN. INTERFERENCE

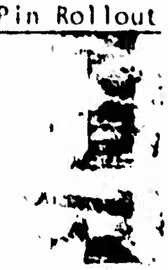
Hole Manufacturing Conditions and Procedures: PRODUCE STD HOLE BORE EXIT OF HOLE AND CHAMFER ENTRANCE WITH A 60° COUNTERSINK

Spindle, rpm 660 Feed: .0015 IPR
Cutting Fluid: DRY Depth: (Ind. Reading)

Hole #1

Surface Finish, AA 27
Protrusion, in. .125
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse .001
Flush Gage Reading, in. .001
Capacitance Gage Reading 294
Exit Burr Height, in.

Bluing Pin Rollout



Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	7.0	9.0	9.0	9.0	8.0	8.0	9.0
#2	3.0	5.0	4.0	3.0	2.0	5.0	3.0
#3	-1.0	5.0	2.0	3.0	-5.0	3.0	1.0
#4	-4.0	2.0	0	1.0	-11.0	-2.0	0
#5	-5.0	-1.0	1.0	0	-8.0	-3.0	1.0

Hole #2

Surface Finish, AA 35
Protrusion, in. .126
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .004
Flush Gage Reading, in. 0
Capacitance Gage Reading 301
Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	8.0	6.0	4.0	1.0	3.0	7.0	8.0
#2	10.0	9.0	8.0	4.0	5.0	7.0	10.0
#3	6.0	5.0	6.0	5.0	4.0	2.0	7.0
#4	2.0	-2.0	2.0	5.0	5.0	1.0	3.0
#5	5.0	0	4.0	1.0	6.0	4.0	2.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 8 Quality Variable BELL MOUTHING
Specimen No. 3A4B MIN. INTERFERENCE

Hole Manufacturing Conditions and Procedures: PRODUCE STD HOLE BORE EXIT OF HOLE AND CHAMFER ENTRANCE WITH A 60° COUNTERSINK

Spindle, rpm 660 Feed: .0015 IPR
Cutting Fluid: DRY Depth: (Ind. Reading) ______

Hole #1

Surface Finish, AA 25
Protrusion, in. .124
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .001
Flush Gage Reading, in. .001
Capacitance Gage Reading 283
Exit Burr Height, in. ______

Bluing Pin Rollout

40%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	5.0	6.0	6.0	5.0	4.0	4.0	5.0
#2	7.0	8.0	8.0	9.0	7.0	6.0	7.0
#3	3.0	6.0	8.0	7.0	4.0	2.0	7.0
#4	5.0	2.0	5.0	3.0	5.0	-1.0	5.0
#5	4.0	-1.0	4.0	1.0	5.0	0	3.0

Hole #2

Surface Finish, AA 15
Protrusion, in. .123
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .0025
Flush Gage Reading, in. 0
Capacitance Gage Reading 276
Exit Burr Height, in. ______

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	5.0	5.0	5.0	5.0	8.0	9.0	8.0
#2	8.0	8.0	8.0	9.0	4.0	7.0	5.0
#3	3.0	8.0	5.0	9.0	-4.0	5.0	-3.0
#4	0	7.0	5.0	2.0	-2.0	2.0	-2.0
#5	-2.0	5.0	5.0	6.0	-10.0	-4.0	1.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 8 Quality Variable BELL MOUTHING
Specimen No. 4A4T MIN. INTERFERENCE

Hole Manufacturing Conditions and Procedures: PRODUCE STD HOLE BORE EXIT OF HOLE AND CHAMFER ENTRANCE WITH A 60° COUNTERSINK.

Spindle, rpm 660 Feed: .0015 IPR
Cutting Fluid: DRY Depth: (Ind. Reading)

Hole #1

Surface Finish, AA 36
Protrusion, in. 100
Perpendicularity, .001 in./in.
Longitudinal .0.05 Transverse .002
Flush Gage Reading, in. .001
Capacitance Gage Reading 279
Exit Burr Height, in.

Bluing Pin Rollout

45%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	6.0	9.0	9.0	5.0	7.0	9.0	9.0
#2	6.0	8.0	9.0	8.0	9.0	7.0	7.0
#3	4.0	8.0	4.0	2.0	9.0	3.0	5.0
#4	4.0	3.0	0	7.0	9.0	1.0	3.0
#5	7.0	5.0	2.0	6.0	9.0	4.0	2.0

Hole #2

Surface Finish, AA 40
Protrusion, in. 137
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse .001
Flush Gage Reading, in. .0
Capacitance Gage Reading 228
Exit Burr Height, in.

Bluing Pin Rollout

35%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	6.0	8.0	8.0	6.0	7.0	6.0	8.0
#2	7.0	[illegible]	6.0	7.0	8.0	6.0	8.0
#3	[illegible]	8.0	8.0	7.0	9.0	5.0	8.0
#4	7.0	7.0	9.0	8.0	8.0	2.0	8.0
#5	6.0	4.0	8.0	8.0	5.0	7.0	5.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 8 Quality Variable Bell Mouthing
Specimen No. 2E2B Min. Interference

Hole Manufacturing Conditions and Procedures: Produce Std Hole Bore Exit of Hole and Chamfer Entrance With A 60° Countersink

Spindle, rpm 660 Feed: .0015 IPR
Cutting Fluid: Dry Depth: (Ind. Reading)

Hole #1

Surface Finish, AA 25
Protrusion, in. 126
Perpendicularity, .001 in./in.
Longitudinal .002 Transverse .001
Flush Gage Reading, in. 0
Capacitance Gage Reading 260
Exit Burr Height, in.

Bluing Pin Rollout

35%

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	8.0	8.0	6.0	4.0	5.0	7.0	5.0
#2	9.0	10.0	8.0	8.0	5.0	8.0	7.0
#3	5.0	9.0	8.0	9.0	0	3.0	6.0
#4	0	7.0	7.0	7.0	-7.0	0	7.0
#5	1.0	3.0	7.0	6.0	2.0	1.0	6.0

Hole #2

Surface Finish, AA 20
Protrusion, in. 119
Perpendicularity, .001 in./in.
Longitudinal .0005 Transverse 0
Flush Gage Reading, in. 0
Capacitance Gage Reading 274
Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	4.0	4.0	6.0	9.0	8.0	6.0	5.0
#2	2.0	6.0	7.0	11.0	9.0	5.0	8.0
#3	0	3.0	8.0	7.0	9.0	0	9.0
#4	4.0	0	5.0	0	9.0	-1.0	5.0
#5	4.0	0	4.0	0	6.0	1.0	4.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 8 Quality Variable BELL MOUTHING

Specimen No. 205B MIN. INTERFERENCE

Hole Manufacturing Conditions and Procedures: PRODUCE STD HOLE BORE EXIT OF HOLE AND CHAMFER ENTRANCE WITH A 60° COUNTERSINK

Spindle, rpm 660 Feed: .0015 IPR

Cutting Fluid: DRY Depth: (Ind. Reading)

Hole #1

Surface Finish, AA 30

Protrusion, in. 125

Perpendicularity, .001 in./in.

Longitudinal .001 Transverse .002

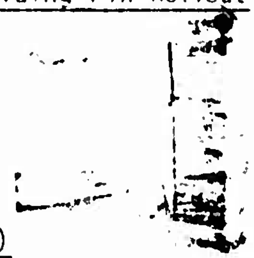
Flush Gage Reading, in. -.001

Capacitance Gage Reading 290

Exit Burr Height, in.

Bluing Pin Rollout

35%



Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	180°	225°	270°	315°
Bottom #1	6.0	4.0	6.0	8.0	6.0	6.0	6.0
#2	7.0	6.0	6.0	9.0	7.0	7.0	8.0
#3	6.0	1.0	2.0	6.0	2.0	4.0	8.0
#4	4.0	-3.0	-2.0	6.0	2.0	2.0	6.0
#5	5.0	0	-1.0	5.0	0	-2.0	3.0

Hole #2

Surface Finish, AA 38

Protrusion, in. 112

Perpendicularity, .001 in./in.

Longitudinal .0 Transverse .001

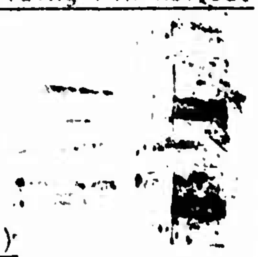
Flush Gage Reading, in. .002

Capacitance Gage Reading 260

Exit Burr Height, in.

Bluing Pin Rollout

40%



Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	180°	225°	270°	315°
Bottom #1	6.0	6.0	6.0	6.0	5.0	5.0	6.0
#2	4.0	6.0	8.0	7.0	7.0	8.0	6.0
#3	2.0	2.0	6.0	5.0	3.0	8.0	3.0
#4	1.0	-1.0	1.0	5.0	-2.0	6.0	4.0
#5	4.0	0	-1.0	4.0	0	4.0	7.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 8 Quality Variable BELL MOUTHING MIN INTERFERENCE
Specimen No. 2ESB

Hole Manufacturing Conditions and Procedures: PRODUCE STD HOLE BORE EXIT OF HOLE AND CHAMFER ENTRANCE WITH A 60° COUNTERSINK

Spindle, rpm 660 Feed: .0015 IPR
Cutting Fluid: DRY Depth: (Ind. Reading)

Hole #1

Surface Finish, AA 20
Protrusion, in. .120
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse .00035
Flush Gage Reading, in. .002
Capacitance Gage Reading 330
Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	3.0	4.0	5.0	6.0	5.0	4.0	4.0
#2	6.0	5.0	4.0	7.0	8.0	7.0	[illegible]
#3	4.0	3.0	0	0	3.0	4.0	3.0
#4	0	2.0	0	0	-1.0	-2.0	0
#5	0	1.0	1.0	2.0	2.0	1.0	0

Hole #2

Surface Finish, AA 35
Protrusion, in. .125
Perpendicularity, .001 in./in.
Longitudinal .002 Transverse .005
Flush Gage Reading, in. .002
Capacitance Gage Reading 292
Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	9.0	7.0	5.0	-1.0	6.0	7.0	9.0
#2	11.0	11.0	8.0	2.0	5.0	2.0	10.0
#3	5.0	7.0	5.0	5.0	4.0	3.0	5.0
#4	2.0	0	0	2.0	6.0	3.0	5.0
#5	5.0	0	2.0	3.0	4.0	5.0	6.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 8 Quality Variable Bell Mouthing
Specimen No. 3A4F Min. Interference

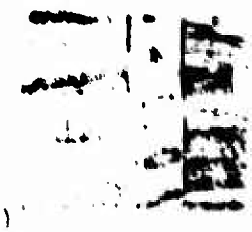
Hole Manufacturing Conditions and Procedures: Produce Std Hole Bore Exit of Hole and Chamfer Entrance With A 60° Countersink

Spindle, rpm 660 Feed: .0015 IPR
Cutting Fluid: Dry Depth: (Ind. Reading)

Hole #1

Surface Finish, AA 30
Protrusion, in. .125
Perpendicularity, .001 in./in.
Longitudinal .0015 Transverse .002
Flush Gage Reading, in. .003
Capacitance Gage Reading 280
Exit Burr Height, in.

Bluing Pin Rollout



Air Gage Readings (.0001 in.)

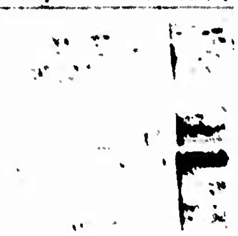
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	2.0	3.0	5.0	8.0	7.0	7.0	4.0
#2	6.0	7.0	7.0	9.0	7.0	7.0	7.0
#3	6.0	2.0	3.0	7.0	2.0	2.0	4.0
#4	4.0	-3.0	0	4.0	4.0	0	3.0
#5	3.0	1.0	[illegible]	3.0	3.0	-1.0	4.0

Hole #2

Surface Finish, AA 38
Protrusion, in. .114
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .001
Flush Gage Reading, in. .003
Capacitance Gage Reading 283
Exit Burr Height, in.

Bluing Pin Rollout



Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	3.0	4.0	7.0	8.0	7.0	4.0	4.0
#2	6.0	7.0	8.0	9.0	5.0	6.0	4.0
#3	4.0	2.0	6.0	5.0	2.0	5.0	2.0
#4	3.0	-4.0	1.0	4.0	-4.0	4.0	2.0
#5	7.0	-2.0	0	3.0	-2.0	2.0	5.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 8 Quality Variable BellMouthing

Specimen No. 2D3B Max. Interference

Hole Manufacturing Conditions and Procedures: Produce Std. Hole Bore Exit of Hole And Chamfer Entrance With A 60° Counter Sink

Spindle, rpm 660 Feed: .0015 IPR

Cutting Fluid: Dry Depth: (Ind. Reading)

Hole #1

Surface Finish, AA 45

Protrusion, in. .236

Perpendicularity, .001 in./in.

Longitudinal 0 Transverse .002

Flush Gage Reading, in. .0

Capacitance Gage Reading .296

Exit Burr Height, in.

Bluing Pin Rollout

40%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-3.0	-5.0	-7.0	-3.0	-7.0	-9.0	-4.0
#2	2.0	3.0	3.0	3.0	3.0	0	2.0
#3	2.0	5.0	5.0	4.0	7.0	4.0	0
#4	1.0	5.0	5.0	6.0	7.0	6.2	2.0
#5	—	—	—	14.0	—	—	—

Hole #2

Surface Finish, AA 55

Protrusion, in. .243

Perpendicularity, .001 in./in.

Longitudinal .0015 Transverse .0015

Flush Gage Reading, in. .002

Capacitance Gage Reading .325

Exit Burr Height, in.

Bluing Pin Rollout

45%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-7.0	-5.0	-9.0	-4.0	-4.0	-8.0	-8.0
#2	2.0	2.0	1.0	2.0	3.0	-1.0	-2.0
#3	4.0	6.0	5.0	4.0	5.0	3.0	1.0
#4	6.0	6.0	6.0	1.0	5.0	2.0	-1.0
#5	—	—	—	13.0	14.0	15.0	15.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 8   Quality Variable BELL MOUTHING
Specimen No. 2A4T   MAX. INTERFERENCE

Hole Manufacturing Conditions and Procedures: PRODUCE STD. HOLE BORE EXIT OF HOLE AND CHAMFER ENTRANCE WITH A 60° COUNTER SINK

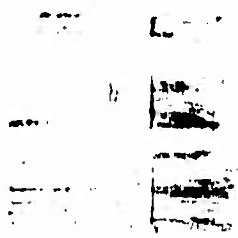
Spindle, rpm 660   Feed: .0015 IPR
Cutting Fluid: DRY   Depth: (Ind. Reading)

Hole #1

Surface Finish, AA 40
Protrusion, in. .237
Perpendicularity, .001 in./in.
Longitudinal .002 Transverse .002
Flush Gage Reading, in. .001
Capacitance Gage Reading 323
Exit Burr Height, in.

Bluing Pin Rollout

40%



Air Gage Readings (.0001 in.)

Angular Position

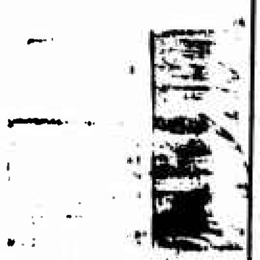
Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-5.0	-3.0	-5.0	-10.0	-9.0	-9.0	-3.0
#2	0	2.0	2.0	0	0	0	2.0
#3	3.0	1.0	1.0	[illegible]	0	2.0	4.2
#4	4.0	0	0	4.0	0	1.0	4.0
#5	—	—	—	14.0	14.0	—	—

Hole #2

Surface Finish, AA 28
Protrusion, in. .244
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse .0025
Flush Gage Reading, in. .001
Capacitance Gage Reading 380
Exit Burr Height, in.

Bluing Pin Rollout

45%



Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-6.0	-8.0	-11.0	-7.0	-8.0	-8.0	-7.0
#2	2.0	2.0	0	1.0	1.0	0	-1.0
#3	2.0	2.0	2.0	1.0	3.0	3.0	0
#4	-1.0	0	1.0	0	2.0	2.0	0
#5	—	—	—	13.0	—	15.0	—

MANUFACTURING REPORT: TAPERED HOLES

Test Series 8 Quality Variable BELLMOUTHING
Specimen No. IFLB MAX. INTERFERENCE

Hole Manufacturing Conditions and Procedures: PRODUCE STD. HOLE BORE EXIT OF HOLE AND CHAMFER ENTRANCE WITH A 60° COUNTER SINK

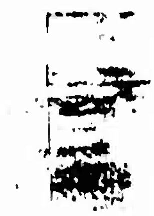
Spindle, rpm 660 Feed: .0015 IPR
Cutting Fluid: DRY Depth: (Ind. Reading) ______

Hole #1

Surface Finish, AA 85
Protrusion, in. .239
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .001
Flush Gage Reading, in. .002
Capacitance Gage Reading .327
Exit Burr Height, in. ______

Bluing Pin Rollout

50%



Air Gage Readings (.0001 in.)
Angular Position

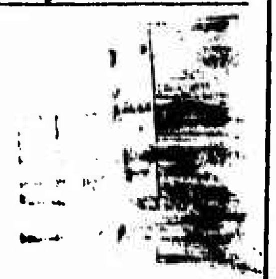
Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-7.0	-6.0	-9.0	-8.0	-6.0	-10.0	-4.0
#2	-1.0	2.5	1.0	2.0	3.5	1.0	2.5
#3	2.0	4.0	3.5	3.0	5.0	3.0	3.0
#4	3.5	2.0	3.0	3.5	5.0	3.0	1.0
#5	—	—	—	14.0	—	15.0	—

Hole #2

Surface Finish, AA 32
Protrusion, in. .200
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse .002
Flush Gage Reading, in. .002
Capacitance Gage Reading .294
Exit Burr Height, in. ______

Bluing Pin Rollout

40%



Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-6.0	-8.0	-4.0	-4.0	-5.0	-5.0	-4.0
#2	3.0	0	2.0	4.0	2.0	4.0	2.0
#3	6.0	1.5	4.5	6.0	3.0	5.0	2.0
#4	7.0	4.0	5.0	6.5	3.0	5.0	0
#5	—	—	—	—	—	—	—

MANUFACTURING REPORT: TAPERED HOLES

Test Series 8 Quality Variable BELLMOUTHING

Specimen No. 2C6T MAX. INTERFERENCE

Hole Manufacturing Conditions and Procedures: PRODUCE STD. HOLE BORE EXIT OF HOLE AND CHAMFER ENTRANCE WITH A 60° COUNTER SINK

Spindle, rpm 660 Feed: .0015 IPR

Cutting Fluid: DRY Depth: (Ind. Reading)

Hole #1

Surface Finish, AA 80

Protrusion, in. .244

Perpendicularity, .001 in./in.

Longitudinal .0005 Transverse .0025

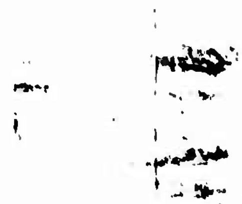
Flush Gage Reading, in. -.001

Capacitance Gage Reading 300

Exit Burr Height, in.

Bluing Pin Rollout

35%



Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-3.0	-3.0	-7.0	-8.0	-4.0	-9.0	-3.0
#2	0	4.0	1.0	1.0	4.0	0	4.0
#3	2.0	5.0	4.0	3.0	5.0	2.0	5.0
#4	2.0	4.0	3.0	2.0	2.0	3.0	4.0
#5	—	—	—	—	—	14.0	15.0

Hole #2

Surface Finish, AA 30

Protrusion, in. .241

Perpendicularity, .001 in./in.

Longitudinal .002 Transverse .002

Flush Gage Reading, in. .001

Capacitance Gage Reading 326

Exit Burr Height, in.

Bluing Pin Rollout

40%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-6.0	-4.0	-7.0	-5.0	-5.0	-7.0	-2.0
#2	1.0	4.0	0	2.0	2.0	1.0	4.0
#3	2.0	4.0	3.0	2.0	3.0	1.0	4.0
#4	3.0	4.0	3.0	2.0	3.0	1.0	5.0
#5	—	—	—	15.0	—	—	—

MANUFACTURING REPORT: TAPERED HOLES

Test Series 8 Quality Variable BellMouthing
Specimen No. 3C6B Max. Interference

Hole Manufacturing Conditions and Procedures: Produce Std. Hole Bore Exit of Hole And Chamfer Entrance With A 60° Counter Sink

Spindle, rpm 660 Feed: .0015 IPR
Cutting Fluid: Dry Depth: (Ind. Reading)

Hole #1

Surface Finish, AA 40
Protrusion, in. .239
Perpendicularity, .001 in./in.
Longitudinal .0005 Transverse .001
Flush Gage Reading, in. -.001
Capacitance Gage Reading 323
Exit Burr Height, in.

Bluing Pin Rollout

35%

Air Gage Readings (.0001 in.)
Angular Position

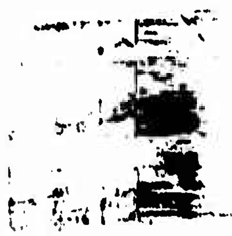
Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-4.0	-5.0	-8.0	-3.5	-5.0	-8.0	-5.0
#2	2.0	2.5	-1.0	4.5	3.0	-1.0	1.0
#3	4.0	4.5	2.0	4.5	6.0	2.0	1.0
#4	4.0	5.0	2.5	3.0	8.0	3.0	1.0
#5	—	—	—	14.0	—	—	—

Hole #2

Surface Finish, AA 42
Protrusion, in. .245
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .002
Flush Gage Reading, in. 0
Capacitance Gage Reading 280
Exit Burr Height, in.

Bluing Pin Rollout

40%



Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-4.0	-6.0	-5.0	-4.0	-6.0	-4.0	-6.0
#2	2.0	3.0	2.0	1.0	5.0	4.0	3.0
#3	2.0	4.0	3.0	2.0	6.0	4.0	5.0
#4	2.0	6.0	2.0	2.0	6.0	6.0	7.0
#5	—	—	—	—	—	—	—

MANUFACTURING REPORT: TAPERED HOLES

Test Series 8 Quality Variable BellMouthing
Specimen No. 4B2BC Max. Interference

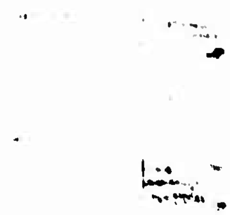
Hole Manufacturing Conditions and Procedures: Produce Std. Hole Bore Exit of Hole And Chamfer Entrance With A 60° Counter Sink

Spindle, rpm 660 Feed: .0015 IPR
Cutting Fluid: Dry Depth: (Ind. Reading)

Hole #1

Surface Finish, AA 55
Protrusion, in. .230
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse .0015
Flush Gage Reading, in. .001
Capacitance Gage Reading 358
Exit Burr Height, in.

Bluing Pin Rollout



40%

Air Gage Readings (.0001 in.)

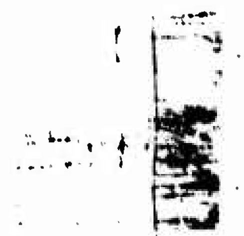
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-8.0	-6.0	-6.0	-6.0	-6.0	-7.0	-10.0
#2	2.0	0	3.0	1.0	1.0	2.0	-2.0
#3	2.0	0	3.0	4.0	3.0	4.0	2.0
#4	2.0	-1.0	2.0	3.0	0	4.0	2.0
#5	—	—	—	—	—	—	—

Hole #2

Surface Finish, AA 35
Protrusion, in. .244
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .002
Flush Gage Reading, in. .002
Capacitance Gage Reading 311
Exit Burr Height, in.

Bluing Pin Rollout



Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-2.0	-7.0	-10.0	-4.0	-8.0	-9.0	-5.0
#2	4.0	2.0	-2.0	2.0	3.0	0	2.0
#3	4.0	5.0	2.0	4.0	6.0	4.0	2.0
#4	3.0	4.0	3.0	2.0	6.0	4.0	1.0
#5	15.0	—	—	—	—	—	—

MANUFACTURING REPORT: TAPERED HOLES

Test Series 8 Quality Variable BELLMOUTHING
Specimen No. 3D3B MAX. INTERFERENCE

Hole Manufacturing Conditions and Procedures: PRODUCE STD. HOLE BORE EXIT OF HOLE AND CHAMFER ENTRANCE WITH A 60° COUNTER SINK

Spindle, rpm 660 Feed: .0015 IPR
Cutting Fluid: DRY Depth: (Ind. Reading)

Hole #1

Surface Finish, AA 50
Protrusion, in. .245
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .001
Flush Gage Reading, in. 0
Capacitance Gage Reading 299
Exit Burr Height, in.

Bluing Pin Rollout

35%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-3.0	-7.0	-5.0	-3.0	-10.0	-5.0	-7.0
#2	3.0	-2.0	2.0	5.0	-1.0	2.0	0
#3	5.0	0	2.0	5.0	2.0	5.0	4.0
#4	5.0	8.0	0	3.0	3.0	3.0	4.0
#5	—	13.0	—	—	—	—	—

Hole #2

Surface Finish, AA 32
Protrusion, in. .237
Perpendicularity, .001 in./in.
Longitudinal .002 Transverse .0015
Flush Gage Reading, in. 0
Capacitance Gage Reading 350
Exit Burr Height, in.

Bluing Pin Rollout

45%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-8.0	-4.0	-6.0	-9.0	-4.0	-10.0	-5.0
#2	0	4.0	3.0	1.0	3.0	-1.0	3.0
#3	3.0	3.0	4.0	4.0	5.0	3.0	5.0
#4	4.0	2.0	3.0	4.0	3.0	2.0	6.0
#5	—	—	—	—	14.0	—	—

MANUFACTURING REPORT: TAPERED HOLES

Test Series 8 Quality Variable BellMouthing
Specimen No. 3C1T Max. Interference

Hole Manufacturing Conditions and Procedures: Produce Std. Hole Bore Exit of Hole And Chamfer Entrance With A 60° Counter Sink

Spindle, rpm 660 Feed: .0015 IPR
Cutting Fluid: Dry Depth: (Ind. Reading)

Hole #1

Surface Finish, AA 70
Protrusion, in. .244
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .002
Flush Gage Reading, in. .003
Capacitance Gage Reading .302
Exit Burr Height, in.

Bluing Pin Rollout

40%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-3.0	-7.0	-7.0	-5.0	-8.0	-8.5	-7.0
#2	1.0	3.0	1.0	3.0	3.0	0	2.0
#3	1.0	4.5	1.0	3.5	4.0	0	3.0
#4	3.5	6.0	2.0	3.0	4.0	1.0	3.0
#5	—	—	—	—	—	14.0	—

Hole #2

Surface Finish, AA 75
Protrusion, in. .245
Perpendicularity, .001 in./in.
Longitudinal .0025 Transverse .002
Flush Gage Reading, in. .002
Capacitance Gage Reading .290
Exit Burr Height, in.

Bluing Pin Rollout

40%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-2.0	-8.0	-4.0	-5.0	-9.5	-8.0	-3.0
#2	4.0	0	2.0	5.0	0	1.5	4.0
#3	7.0	3.0	3.0	7.0	2.0	4.0	6.0
#4	7.0	3.0	1.0	7.0	2.5	4.0	4.0
#5	—	—	—	—	—	—	—

MANUFACTURING REPORT: TAPERED HOLES

Test Series 8 Quality Variable BELLMOUTHING
Specimen No. 4E4T MAX. INTERFERENCE

Hole Manufacturing Conditions and Procedures: PRODUCE STD. HOLE BORE EXIT OF HOLE AND CHAMFER ENTRANCE WITH A 60° COUNTER SINK

Spindle, rpm 660 Feed: .0015 IPR
Cutting Fluid: DRY Depth: (Ind. Reading) ____

Hole #1

Surface Finish, AA 70
Protrusion, in. .243
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse .002
Flush Gage Reading, in. .002
Capacitance Gage Reading .331
Exit Burr Height, in. ____

Bluing Pin Rollout

50%

Air Gage Readings (.0001 in.)

Angular Position

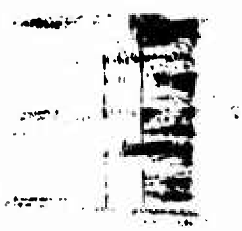
Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-4.0	-8.0	-5.0	-5.0	-7.0	-6.0	-6.0
#2	2.0	0	2.5	2.0	2.0	3.0	0
#3	3.0	1.0	2.0	2.0	3.0	4.0	2.5
#4	3.0	0	1.0	2.0	4.0	2.0	4.0
#5	14.5	—	—	—	14.5	—	—

Hole #2

Surface Finish, AA 80
Protrusion, in. .240
Perpendicularity, .001 in./in.
Longitudinal .0015 Transverse .001
Flush Gage Reading, in. .0
Capacitance Gage Reading .289
Exit Burr Height, in. ____

Bluing Pin Rollout

45%



Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-3.0	-8.0	-7.0	-4.0	-10.0	-7.0	-8.0
#2	5.0	2.0	2.0	5.0	1.0	0	1.0
#3	6.0	4.0	0	5.0	1.0	0	3.0
#4	5.0	5.0	-1.0	3.0	3.0	1.0	2.0
#5	—	—	—	—	13.0	13.0	—

MANUFACTURING REPORT: TAPERED HOLES

Test Series 8 Quality Variable BELLMOUTHING
Specimen No. 1D4T MAX. INTERFERENCE

Hole Manufacturing Conditions and Procedures: PRODUCE STD. HOLE BORE EXIT OF HOLE AND CHAMFER ENTRANCE WITH A 60° COUNTER SINK

Spindle, rpm 660 Feed: .0015 IPR
Cutting Fluid: DRY Depth: (Ind. Reading)

Hole #1

Surface Finish, AA 30
Protrusion, in. .244
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .002
Flush Gage Reading, in. .002
Capacitance Gage Reading .305
Exit Burr Height, in.

Bluing Pin Rollout

45%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-5.0	-3.5	-3.0	-6.0	-4.0	-6.0	-4.0
#2	-1.0	2.5	2.0	-1.0	2.0	2.0	3.0
#3	0	3.0	3.0	1.0	3.0	4.0	6.0
#4	0	1.0	1.0	1.0	2.0	3.0	5.0
#5	—	—	—	—	13.0	13.0	—

Hole #2

Surface Finish, AA 40
Protrusion, in. .241
Perpendicularity, .001 in./in.
Longitudinal .0015 Transverse .0005
Flush Gage Reading, in. 0
Capacitance Gage Reading 318
Exit Burr Height, in.

Bluing Pin Rollout

40%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-8.0	-8.0	-7.0	-8.0	-4.0	-2.0	-4.0
#2	1.0	1.0	2.0	0	4.0	2.0	4.0
#3	0	2.0	2.0	2.0	4.0	3.0	6.0
#4	0	2.0	1.0	3.0	2.0	3.0	7.0
#5	—	—	—	14.0	—	—	—

INSPECTION SHEETS FOR TEST SERIES 9 - SURFACE ROUGHNESS

EFFECTS OF HOLE QUALITY

Test Series 9 Quality Variable [illegible] (63 [illegible])

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: [illegible]
Cutting Fluid: [illegible] Depth: (Ind. Reading) 1.950

Results: Specimen No. [illegible] Hole #1

Surface Finish, AA [illegible]-62 [illegible]
Protrusion, in. .169
Perpendicularity, .001 in./gage length
Longitudinal .004/inch Transverse 0
Flush Gage Reading, in. .002
Capacitance Gage Reading: 321
Exit Burr Height, in. —

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3	+2	+2	+2	+2	+2	+2	+2	+2
#4	0	0	0	0	0	0	0	0
#5	+0.5	+0.5	[illegible]	+0.5	+0.5	+0.5	+0.5	+0.5

Hole #2

Surface Finish, AA 50-63 [illegible]
Protrusion, in. .172
Perpendicularity, .001 in./gage length
Longitudinal .003/inch Transverse .003/inch
Flush Gage Reading, in. .002
Capacitance Gage Reading: 352
Exit Burr Height, in. —

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3	+1	+1	+1	+1	+1	+1	+1	+1
#4	0	0	0	0	0	0	0	0
#5	+0.5	+0.5	+0.5	+0.5	+0.5	+0.5	+0.5	+0.5

EFFECTS OF HOLE QUALITY

Test Series 9 Quality Variable Surface Roughness (63 μin.)

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: Hand – 0.5 IPM
Cutting Fluid: Tap Magic – Alum. Depth: (Ind. Reading) 1.949

Results: Specimen No. 2E1T Hole #1

Surface Finish, AA 48-65 μin Bluing Pin Rollout
Protrusion, in. .174
Perpendicularity, .001 in./gage length
Longitudinal .001/inch Transverse .004/inch
Flush Gage Reading, in. .004
Capacitance Gage Reading: 268
Exit Burr Height, in.

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3	open							
#4	+0.5	0	+0.5	0	+0.5	0	0	0
#5	0	0	0	+1	+0.5	+0.5	0	0

Hole #2

Surface Finish, AA 55-68 μin Bluing Pin Rollout
Protrusion, in. .172
Perpendicularity, .001 in./gage length
Longitudinal 0 Transverse .003/inch
Flush Gage Reading, in. .003
Capacitance Gage Reading: 305
Exit Burr Height, in.

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0

EFFECTS OF HOLE QUALITY

Test Series 9 Quality Variable Single Roughness (63 μin)

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND - 0 5 IPM
Cutting Fluid: TAP MAGIC - ALUM. Depth: (Ind. Reading) 1.949

Results: Specimen No. 5C6B . Hole #1
Surface Finish, AA 42-62 μ in.
Protrusion, in. .189
Perpendicularity, .001 in./gage length
Longitudinal .002/INCH Transverse 0
Flush Gage Reading, in. .004
Capacitance Gage Reading: 288
Exit Burr Height, in. -

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3	+1	+1	+1	+1	+1	+1	+1	+1
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0

Hole #2
Surface Finish, AA 60-70 μ in.
Protrusion, in. .169
Perpendicularity, .001 in./gage length
Longitudinal .001/INCH Transverse .003/INCH
Flush Gage Reading, in. .004
Capacitance Gage Reading: 275
Exit Burr Height, in. -

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3	+3	+3	+3	+3	+3	+3	+3	+3
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0

EFFECTS OF HOLE QUALITY

Test Series 9 Quality Variable SURFACE ROUGHNESS (63 μin.)

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND - 1.0 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.950

Results: Specimen No. 5AG8 Hole #1

Surface Finish, AA 42-52 μ in.
Protrusion, in. .174
Perpendicularity, .001 in./gage length
Longitudinal .003/inch Transverse .001/inch
Flush Gage Reading, in. .002
Capacitance Gage Reading: 298
Exit Burr Height, in. —

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	0	0	0	0	0	0	0	0
#5	0	0	+0.5	6	+0.5	+0.5	+0.5	0

Hole #2

Surface Finish, AA 63-68 μ in.
Protrusion, in. .170
Perpendicularity, .001 in./gage length
Longitudinal .002/inch Transverse 0
Flush Gage Reading, in. .002
Capacitance Gage Reading: 297
Exit Burr Height, in. —

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3	+1	+1.5	+1.5	+1.5	+1.5	+1	+1	+1
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	+0.5	0	+0.5	+0.5

EFFECTS OF HOLE QUALITY

Test Series 9 Quality Variable [illegible]

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 210 Feed: HAND - 1.0 IPM
Cutting Fluid: DRY Depth: (Ind. Reading) 1.350

Results: Specimen No. 5B1CT Hole #1
Surface Finish, AA 45-62 μ in. Bluing Pin Rollout
Protrusion, in. .224
Perpendicularity, .001 in./gage length
Longitudinal .001/inch Transverse .002/inch
Flush Gage Reading, in. .003
Capacitance Gage Reading: 240
Exit Burr Height, in. —

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	0	+0.5	0	+0.5	0	+0.5	0	+0.5
#5	+0.5	+1	+0.5	+1	+2.5	+1	0	+1

Hole #2

Surface Finish, AA 48-62 μ in. Bluing Pin Rollout
Protrusion, in. .231
Perpendicularity, .001 in./gage length
Longitudinal .001/inch Transverse .001/inch
Flush Gage Reading, in. .002
Capacitance Gage Reading: 230
Exit Burr Height, in. —

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	0	+0.5	0	+0.5	0	+0.5	0	+0.5
#5	0	+1	0	+1	0	+1	0	+1

EFFECTS OF HOLE QUALITY

Test Series 9 Quality Variable SURFACE ROUGHNESS (63 μin)

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 210 Feed: HAND - 1.0 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.550

Results: Specimen No. 5056 Hole #1
Surface Finish, AA 50-62 μin Bluing Pin Rollout
Protrusion, in. .193
Perpendicularity, .001 in./gage length
Longitudinal .001/INCH Transverse .002/INCH
Flush Gage Reading, in. .003
Capacitance Gage Reading: 229
Exit Burr Height, in.

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	0	+1	0	+1	+0.5	+1	+0.5	+1
#5	+0.5	0	+0.5	+1	0	+1	+0.5	0.5

Hole #2

Surface Finish, AA 40-52 μin Bluing Pin Rollout
Protrusion, in. .201
Perpendicularity, .001 in./gage length
Longitudinal .001/INCH Transverse .002/INCH
Flush Gage Reading, in. .003
Capacitance Gage Reading: 261
Exit Burr Height, in.

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	+1	0	+0.5	0	+0.5	+0.5	+0.5	+0.5
#5	+1	0	+0.5	0	0	+0.5	+0.5	0

EFFECTS OF HOLE QUALITY

Test Series 9 Quality Variable Surface Roughness (63 μ in.)

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 210 Feed: HAND ~1.02 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.950

Results: Specimen No. 5D6CB . Hole #1

Surface Finish, AA 37 - 50 μ in

Protrusion, in. .199

Perpendicularity, .001 in./gage length

Longitudinal .003/INCH Transverse .001/INCH

Flush Gage Reading, in. .003

Capacitance Gage Reading: 260

Exit Burr Height, in. —

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	0	+0.5	+0.5	+2.5	+0.5	0	0	0
#5	+1	+1	+1.5	+1	+1.5	+1	+0.5	+1

Hole #2

Surface Finish, AA 42-55 μ in

Protrusion, in. .201

Perpendicularity, .001 in./gage length

Longitudinal .001/INCH Transverse .001/INCH

Flush Gage Reading, in. .003

Capacitance Gage Reading: 267

Exit Burr Height, in. —

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	0	0	0	0	0	0	+0.5	0
#5	+1	+0.5	+0.5	+0.5	0	+1	+2.5	+0.5

EFFECTS OF HOLE QUALITY

Test Series 9 Quality Variable SURFACE ROUGHNESS (63 μin.)

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 210 Feed: HAND - 1.0 IPM
Cutting Fluid: DRY Depth: (Ind. Reading) 1.950

Results: Specimen No. 2A6R Hole #1

Surface Finish, AA 35 - 55 μin

Protrusion, in. .138

Perpendicularity, .001 in./gage length

Longitudinal .002/INCH Transverse .002/INCH

Flush Gage Reading, in. .002

Capacitance Gage Reading: 266

Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	+0.5	+0.5	+0.5	+0.5	+0.5	+0.5	+0.5	+0.5
#5	0	0	0	0	0	0	0	0

Hole #2

Surface Finish, AA 50-60 μin

Protrusion, in. .155

Perpendicularity, .001 in./gage length

Longitudinal .001/INCH Transverse .006/INCH

Flush Gage Reading, in. .004

Capacitance Gage Reading: 262

Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	+1.5	+1.5	+1.5	+1	+1	+1	+1	+1.5
#5	+0.5	+0.5	+0.5	0	0	0	0	0

EFFECTS OF HOLE QUALITY

Test Series 9 Quality Variable SURFACE ROUGHNESS (63μin)

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 210 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.950

Results: Specimen No. 5E5CT Hole #1
Surface Finish, AA 42-48 μin Bluing Pin Rollout
Protrusion, in.
Perpendicularity, .001 in./gage length
Longitudinal .002/INCH Transverse .002/INCH
Flush Gage Reading, in. .003
Capacitance Gage Reading: 332
Exit Burr Height, in.

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
	Angular Position							
Bottom #1								
#2								
#3								
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0

Hole #2
Surface Finish, AA 49-52 μin Bluing Pin Rollout
Protrusion, in.
Perpendicularity, .001 in./gage length
Longitudinal .001/INCH Transverse .002/INCH
Flush Gage Reading, in. .004
Capacitance Gage Reading: 262
Exit Burr Height, in.

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
	Angular Position							
Bottom #1								
#2								
#3								
#4	0	+0.5	0	+0.5	0	+0.5	0	+0.5
#5	+1	+1.5	+1	+1.5	+1	+1	+1	+1

EFFECTS OF HOLE QUALITY

Test Series 9 Quality Variable SURFACE ROUGHNESS (63μ in.)

Produce Good Hole Using Following Conditions:

Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: TAP MAGIC - ALUM Depth: (Ind. Reading) 1.950

Results: Specimen No. 2C3T Hole #1

Surface Finish, AA 55-70 μ in. Bluing Pin Rollout
Protrusion, in. .161
Perpendicularity, .001 in./gage length
Longitudinal .003/INCH Transverse .003/INCH
Flush Gage Reading, in. .003
Capacitance Gage Reading: 318
Exit Burr Height, in. —

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3	+4	+4	+4	+4	+4	+4	+4	+4
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0

Hole #2

Surface Finish, AA 45-68 μ in. Bluing Pin Rollout
Protrusion, in. .181
Perpendicularity, .001 in./gage length
Longitudinal 0 Transverse .002/INCH
Flush Gage Reading, in. .003
Capacitance Gage Reading: 298
Exit Burr Height, in.

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3	+2	+2	+2.5	+3	+3	+3	+3	+3
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0

EFFECTS OF HOLE QUALITY

Test Series 9 Quality Variable SURFACE ROUGHNESS (63μ in.)

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 210 Feed: HAND-1.0 IPM
Cutting Fluid: DRY Depth: (Ind. Reading) 1.950

Results: Specimen No. 5C4CB Hole #1

Surface Finish, AA 55-68 μ in
Protrusion, in. .140
Perpendicularity, .001 in./gage length
Longitudinal .001/inch Transverse .002/inch
Flush Gage Reading, in. .004
Capacitance Gage Reading: 288
Exit Burr Height, in. —

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	+1	+1	+1	+1.5	+1.5	+1	+1	+1
#5	0	0	0	0	0	0	0	0

Hole #2

Surface Finish, AA 48-60 μ in
Protrusion, in. .146
Perpendicularity, .001 in./gage length
Longitudinal .003/inch Transverse .001/inch
Flush Gage Reading, in. .00[illegible]
Capacitance Gage Reading: 200
Exit Burr Height, in. —

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	+1	+1	+1	+1	+1	+1	+1	+1
#5	+1	+1	+1	+1	+1.5	+1	+1	+1

EFFECTS OF HOLE QUALITY

Test Series 9 Quality Variable SURFACE - ROUGHNESS (63 μin)

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 210 Feed: HAND - 1.0 IPM
Cutting Fluid: DRY Depth: (Ind. Reading) 1.950

Results: Specimen No. 5A5CT . Hole #1

Surface Finish, AA 60-72 μin Bluing Pin Rollout
Protrusion, in. .150
Perpendicularity, .001 in./gage length
Longitudinal 0 Transverse 0
Flush Gage Reading, in. .003
Capacitance Gage Reading: 271
Exit Burr Height, in.

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	+1	+1	+1	+1	+1	+1	+1	+1
#5	0	0	0	0	0	0	0	0

Hole #2

Surface Finish, AA 52-68 μin Bluing Pin Rollout
Protrusion, in. .151
Perpendicularity, .001 in./gage length
Longitudinal .001/inch Transverse .003/inch
Flush Gage Reading, in. .004
Capacitance Gage Reading: 202
Exit Burr Height, in.

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	+1	+1	+1	+1	+1	+1	+1	+1
#5	+1	+1	+1	+1	+1	+1	+1	+1

EFFECTS OF HOLE QUALITY

Test Series 9 Quality Variable Surface - Roughness (63 μin.)

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 210 Feed: HAND - 1.0 IPM
Cutting Fluid: DRY Depth: (Ind. Reading) 1.950

Results: Specimen No. 5B9C8 . Hole #1
Surface Finish, AA 35 - 58 μin
Protrusion, in. .160
Perpendicularity, .001 in./gage length
Longitudinal .002/inch Transverse .001/inch
Flush Gage Reading, in. .003
Capacitance Gage Reading: 227
Exit Burr Height, in. —

Bluing Pin Rollout

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	+1	+1	+1	+1	+1	+0.5	+1	+1
#5	0	0	+0.5	+[illegible]	+[illegible]	0	0	0

Hole #2
Surface Finish, AA 38-65 μin
Protrusion, in. .163
Perpendicularity, .001 in./gage length
Longitudinal 0 Transverse .001/inch
Flush Gage Reading, in. .003
Capacitance Gage Reading: 201
Exit Burr Height, in. —

Bluing Pin Rollout

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	+1.5	+1.5	+1.5	+1.5	+1.5	+1.5	+1.5	+1.5
#5	+1	+2.5	+1	+1	+1	+1	+1	+1

EFFECTS OF HOLE QUALITY

Test Series 9 Quality Variable SURFACE ROUGHNESS (63 μ in.)

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 210 Feed: HAND - 1.0 IPM
Cutting Fluid: 11Y Depth: (Ind. Reading)

Results: Specimen No. 5A2CT . Hole #1
Surface Finish, AA 50-80 μ in.
Protrusion, in. .146
Perpendicularity, .001 in./gage length
Longitudinal .003/INCH Transverse .004/INCH
Flush Gage Reading, in. .003
Capacitance Gage Reading: 212
Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	+1	+1	+1	+1.5	+1.5	+1.0	+1	+1
#5	+1	+1	+1	+1.5	+1.5	+1.0	+1	+1

Hole #2

Surface Finish, AA 48-63 μ in.
Protrusion, in. .162
Perpendicularity, .001 in./gage length
Longitudinal .002/INCH Transverse .002/INCH
Flush Gage Reading, in. .003
Capacitance Gage Reading: 260
Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	+1	+0.5	+1	+1	+1	+0.5	+1	+1
#5	+0.5	+0.5	+1	+0.5	+0.5	+0.5	+1	+0.5

EFFECTS OF HOLE QUALITY

Test Series 9 Quality Variable Surface Roughness (63μin.)

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 210 Feed: Hand 1.0 IPM
Cutting Fluid: Dry Depth: (Ind. Reading) 1.949

Results: Specimen No. 5A5R Hole #1
Surface Finish, AA 60-70 μin
Protrusion, in. .169
Perpendicularity, .001 in./gage length
Longitudinal 0 Transverse .003/inch
Flush Gage Reading, in. .004
Capacitance Gage Reading: 297
Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3	OPEN							
#4	+1	+1	+1	+1	+1	+1	+1	+1
#5	0	0	0	0	0	0	0	0

Hole #2

Surface Finish, AA 50-60 μin
Protrusion, in. .177
Perpendicularity, .001 in./gage length
Longitudinal .001/inch Transverse .006/inch
Flush Gage Reading, in. .004
Capacitance Gage Reading: 304
Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	0	0	0	0	0	0	0	0
#5	+0.5	+0.5	+0.5	+0.5	+0.5	+0.5	+0.5	+0.5

MANUFACTURING REPORT: TAPERED HOLES

Test Series 9 Quality Variable SURF ROUGHNESS - 63
Specimen No. 4CST

Hole Manufacturing Conditions and Procedures: STD REAMER
GROUP I

Spindle, rpm 660 Feed: .0015
Cutting Fluid: DRY Depth: (Ind. Reading) 1.255

Hole #1

Surface Finish, AA 48
Protrusion, in. .157
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .002
Flush Gage Reading, in. -.001
Capacitance Gage Reading 255
Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1							
#2							
#3							
#4							
#5							

Hole #2

Surface Finish, AA 53
Protrusion, in. .154
Perpendicularity, .001 in./in.
Longitudinal .002 Transverse .002
Flush Gage Reading, in. 001
Capacitance Gage Reading 253
Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1							
#2							
#3							
#4							
#5							

Figure 14 - Sample Manufacturing Report: Tapered Holes

MANUFACTURING REPORT: TAPERED HOLES

Test Series 9 Quality Variable Surf. Roughness - 63
Specimen No. 3ASB

Hole Manufacturing Conditions and Procedures: Std. Reamer
Group I

Spindle, rpm 660 Feed: .0015
Cutting Fluid: Dry Depth: (Ind. Reading) 1.255

Hole #1

Surface Finish, AA 60-65 Bluing Pin Rollout
Protrusion, in. .148
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse 0
Flush Gage Reading, in. -.002
Capacitance Gage Reading 239
Exit Burr Height, in.

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1							
#2							
#3							
#4							
#5							

Hole #2

Surface Finish, AA 55-60 Bluing Pin Rollout
Protrusion, in. .155
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .001
Flush Gage Reading, in. -.002
Capacitance Gage Reading 230
Exit Burr Height, in.

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1							
#2							
#3							
#4							
#5							

Figure 14 - Sample Manufacturing Report: Tapered Holes

MANUFACTURING REPORT: TAPERED HOLES

Test Series 9 Quality Variable Surf. Roughness-63
Specimen No. 4D6B

Hole Manufacturing Conditions and Procedures: Std. Reamer Group I

Spindle, rpm 660 Feed: .0015
Cutting Fluid: Dry Depth: (Ind. Reading) 1.255

Hole #1

Surface Finish, AA 75-80
Protrusion, in. .118
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .0005
Flush Gage Reading, in. -.002
Capacitance Gage Reading 225
Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1							
#2							
#3							
#4							
#5							

Hole #2

Surface Finish, AA 55-60
Protrusion, in. .139
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse .001
Flush Gage Reading, in. -.001
Capacitance Gage Reading 241
Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1							
#2							
#3							
#4							
#5							

Figure 14 - Sample Manufacturing Report: Tapered Holes

MANUFACTURING REPORT: TAPERED HOLES

Test Series 9 Quality Variable SURF ROUGHNESS - 63
Specimen No. 4EZT

Hole Manufacturing Conditions and Procedures: STD. REAMER
GROUP I

Spindle, rpm 660 Feed: .0015
Cutting Fluid: DRY Depth: (Ind. Reading) 1.755

Hole #1

Surface Finish, AA 65-70 **Bluing Pin Rollout**
Protrusion, in. .152
Perpendicularity, .001 in./in.
Longitudinal .0005 Transverse .001
Flush Gage Reading, in. .001
Capacitance Gage Reading 208
Exit Burr Height, in. ______

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1							
#2							
#3							
#4							
#5							

Hole #2

Surface Finish, AA 75-80 **Bluing Pin Rollout**
Protrusion, in. .148
Perpendicularity, .001 in./in.
Longitudinal .002 Transverse 0
Flush Gage Reading, in. .002
Capacitance Gage Reading 205
Exit Burr Height, in. ______

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1							
#2							
#3							
#4							
#5							

Figure 14 - Sample Manufacturing Report: Tapered Holes

MANUFACTURING REPORT: TAPERED HOLES

Test Series 9 Quality Variable SURF. ROUGHNESS - 63
Specimen No. 4C/B

Hole Manufacturing Conditions and Procedures: STD. REAMER
GROUP I

Spindle, rpm 660 Feed: .0015
Cutting Fluid: DRY Depth: (Inc. Reading) 1.255

Hole #1

Surface Finish, AA 60-65
Protrusion, in. .130
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse 0
Flush Gage Reading, in. -.002
Capacitance Gage Reading 198
Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1							
#2							
#3							
#4							
#5							

Hole #2

Surface Finish, AA 65-75
Protrusion, in. .155
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse .001
Flush Gage Reading, in. -.002
Capacitance Gage Reading 215
Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1							
#2							
#3							
#4							
#5							

Figure 14 - Sample Manufacturing Report: Tapered Holes

EFFECTS OF HOLE QUALITY

Test Series 9 Quality Variable SURFACE ROUGHNESS (32 μ in.)

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: TAP MAGIC FOR ALUM. Depth: (Ind. Reading) 1.950

Results: Specimen No. 3C4T . Hole #1
Surface Finish, AA 30 - 38 μ in
Protrusion, in. .183
Perpendicularity, .001 in./gage length
Longitudinal .003/INCH Transverse .003/INCH
Flush Gage Reading, in. .003
Capacitance Gage Reading: 326
Exit Burr Height, in. —

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3	+1.5	+1.5	+1.5	+1.5	+1.5	+1.5	+1.5	+1.5
#4	+0.5	+2.5	+0.5	+0.5	0	0	0	0
#5	0	0	0	0	0	0	0	0

. Hole #2
Surface Finish, AA 30-38 μ in
Protrusion, in. .182
Perpendicularity, .001 in./gage length
Longitudinal .001/INCH Transverse .004/INCH
Flush Gage Reading, in. .002
Capacitance Gage Reading: 313
Exit Burr Height, in. —

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3	+1.5	+1.5	+1.5	+1.5	+1.5	+1.5	+1.5	+1.5
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0

EFFECTS OF HOLE QUALITY

Test Series 9 Quality Variable SURFACE ROUGHNESS (32 μ in.)

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND-0.5 IPM
Cutting Fluid: TAP MAGIC-ALUM. Depth: (Ind. Reading) 1.949

Results: Specimen No. 4C3E . Hole #1

Surface Finish, AA 15-18 μ in.
Protrusion, in. .191
Perpendicularity, .001 in./gage length
Longitudinal .001/inch Transverse .002/inch
Flush Gage Reading, in. .004
Capacitance Gage Reading: 358
Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3	+2	+2	+1	+1	+1	0	+0.5	+0.5
#4	0	0	0	0	0	0	0	0
#5	+1	+0.5	0	0	0	0	0	0

Hole #2

Surface Finish, AA 14-18 μ in.
Protrusion, in. .188
Perpendicularity, .001 in./gage length
Longitudinal .003/inch Transverse .002/inch
Flush Gage Reading, in. .004
Capacitance Gage Reading: 390
Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3	+2	+2.5	+2	+2	+1	+1.5	+1.5	+1.5
#4	0	0	0	0	0	0	0	0
#5	0	+0.5	+0.5	+0.5	+0.5	+0.5	+0.5	+0.5

EFFECTS OF HOLE QUALITY

Test Series 9 Quality Variable SURFACE ROUGHNESS (32 μ in.)

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 210 Feed: HAND - 0.5 IPM
Cutting Fluid: TAP MAGIC - ALUM. Depth: (Ind. Reading) 1.950

Results: Specimen No. 5C2C5 **Hole #1**

Surface Finish, AA 18-25 μ in.
Protrusion, in. .198
Perpendicularity, .001 in./gage length
Longitudinal 0 Transverse .002/inch
Flush Gage Reading, in. .002
Capacitance Gage Reading: 308
Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	0	0	0	0	0	0	0	0
#5	+1	+1	+1	+1	+1	+1	+1	+1

Hole #2

Surface Finish, AA 18-32 μ in.
Protrusion, in. .198
Perpendicularity, .001 in./gage length
Longitudinal .001/inch Transverse 0
Flush Gage Reading, in. .003
Capacitance Gage Reading: 299
Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	0	0	0	0	0	0	0	0
#5	+0.5	+0.5	+1	+1	+1	+1	+1	+1

EFFECTS OF HOLE QUALITY

Test Series 9 Quality Variable SURFACE ROUGHNESS (32 μ in.)

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 210 Feed: HAND - 0.5 IPM
Cutting Fluid: TAP MAGIC - ALUM. Depth: (Ind. Reading) 1.950

Results: Specimen No. 5B4CB Hole #1
Surface Finish, AA 15-30 μ in
Protrusion, in. .195
Perpendicularity, .001 in./gage length
Longitudinal .001/INCH Transverse .002/INCH
Flush Gage Reading, in. .003
Capacitance Gage Reading: 294
Exit Burr Height, in. —

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	0	0	0	0	0	0	0	0
#5	+1	+1	+1	+1	+1	+1	+1	+1

Hole #2

Surface Finish, AA 20-25 μ in
Protrusion, in. .197
Perpendicularity, .001 in./gage length
Longitudinal 0 Transverse 0
Flush Gage Reading, in. .003
Capacitance Gage Reading: 292
Exit Burr Height, in. —

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	0	0	0	0	0	0	0	0
#5	+1	+1	+1	+1	+1	+1	+1	+1

EFFECTS OF HOLE QUALITY

Test Series 9 Quality Variable SURFACE ROUGHNESS (32 μ in.)

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: TAP MAGIC - ALUM. Depth: (Ind. Reading) 1.949

Results: Specimen No. 4B3T **Hole #1**

Surface Finish, AA 32-38 μ in
Protrusion, in. .161
Perpendicularity, .001 in./gage length
Longitudinal .003/INCH Transverse 0
Flush Gage Reading, in. .003
Capacitance Gage Reading: 329
Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0

Hole #2

Surface Finish, AA 28-32 μ in
Protrusion, in. .183
Perpendicularity, .001 in./gage length
Longitudinal .002/INCH Transverse .001/INCH
Flush Gage Reading, in. .002
Capacitance Gage Reading: 315
Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3	+1	+1	+1	+1	+1	+1	+1	+1
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0

EFFECTS OF HOLE QUALITY

Test Series 9 Quality Variable SURFACE ROUGHNESS (125 μ in.)

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, (UNDERSIZE) Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND-10 IPM
Cutting Fluid: DRY Depth: (Ind. Reading) 1.952

Modify Good Holes Using Following Conditions:
Tool: MODIFIED L.H. SPIRAL PIN REAMER
Spindle, rpm 135 Feed: HAND - 3 IPM
Cutting Fluid: DRY Depth: (Ind. Reading) 1.210
Procedure: DRILL & C'SINK WITH UNDERSIZE REAMER THEN REAM WITH MODIFIED PIN REAMER USING MODERATE HAND FEED

Results: Specimen No. 3C6T Hole #1
Surface Finish, AA 100-130 μ in.
Protrusion, in. .190
Perpendicularity, .001 in./gage length
Longitudinal .002/INCH Transverse 000
Flush Gage Reading, in. 003
Capacitance Gage Reading: 297

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3	+ 1	+ 1.5	+ 1.5	+ 1.5	+ 1.5	+ 1.5	+ 2	+ 1.5
#4	+ 1	+ 1	+ 1	+ 1	+ 0.5	+ 0.5	+ 1	+ 1
#5	+ 2	+ 1.5	+ 1	+ 1.5	+ 1	+ 1.5	+ 2	+ 2.5

Hole #2
Surface Finish, AA 90-120 μ in.
Protrusion, in. .183
Perpendicularity, .001 in./gage length
Longitudinal .001/INCH Transverse .001/INCH
Flush Gage Reading, in. .003
Capacitance Gage Reading: 293

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3	+ 3	+ 3	+ 3.5	+ 3.5	+ 4	+ 4	+ 4	+ 4
#4	+ 1	+ 0.5	+ 0.5	+ 1	+ 1	+ 1	+ 1	+ 1
#5	+ 1	+ 1	+ 1	+ 2	+ 1	+ 1	+ 1	+ 1

EFFECTS OF HOLE QUALITY

Test Series 9 Quality Variable SURFACE ROUGHNESS (125 µin.)

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, (UNDERSIZE) Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND ~~10~~ IPM
Cutting Fluid: DRY Depth: (Ind. Reading) 1.948

Modify Good Holes Using Following Conditions:
Tool: MODIFIED L.H. SPIRAL PIN REAMER
Spindle, rpm 135 Feed: HAND - 3 IPM
Cutting Fluid: DRY Depth: (Ind. Reading) 1.200
Procedure: DRILL & C'SINK WITH UNDERSIZE REAMER THEN REAM WITH MODIFIED PIN REAMER USING MODERATE HAND FEED

Results: Specimen No. 4B2T Hole #1
Surface Finish, AA 80-110 µin
Protrusion, in. .178
Perpendicularity, .001 in./gage length
Longitudinal .001/INCH Transverse .001/INCH
Flush Gage Reading, in. .001
Capacitance Gage Reading: 288

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3	OPEN							
#4	+0.5	+0.5	+0.5	+0.5	+0.5	+0.5	+0.5	+0.5
#5	0	0	+1	+1	+1	+1	+1	+1

Hole #2
Surface Finish, AA 80-125 µin
Protrusion, in. .200
Perpendicularity, .001 in./gage length
Longitudinal .002/INCH Transverse .002/INCH
Flush Gage Reading, in. .004
Capacitance Gage Reading: 305

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3	+1	+1	+1	+1	+1	+1	+1	+1
#4	+1	+1	+1	+1	+0.5	+1	+1	+1
#5	+3	+3.5	+3	+3.5	+3.5	+3.5	+4	+4

EFFECTS OF HOLE QUALITY

Test Series 9 Quality Variable SURFACE ROUGHNESS (125μin.)

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, (UNDERSIZE) Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND ~~10~~ IPM
Cutting Fluid: DRY Depth: (Ind. Reading) 1.952

Modify Good Holes Using Following Conditions:
Tool: MODIFIED LH SPIRAL PIN REAMER
Spindle, rpm 135 Feed: HAND - 3 IPM
Cutting Fluid: DRY Depth: (Ind. Reading) 1.210
Procedure: DRILL & C'SINK WITH UNDERSIZE REAMER THEN REAM WITH MODIFIED PIN REAMER USING MODERATE HAND FEED

Results: Specimen No. 3C5T Hole #1
Surface Finish, AA 85-150 μin
Protrusion, in. .173
Perpendicularity, .001 in./gage length
Longitudinal .003/INCH Transverse .002/INCH
Flush Gage Reading, in. 0
Capacitance Gage Reading: 265

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3	OPEN							
#4	0	0	0	0	0	0	0	0
#5	+1	+1	+1	+1	+1	+1	+1	+1

Hole #2

Surface Finish, AA 90-140 μin.
Protrusion, in. .186
Perpendicularity, .001 in./gage length
Longitudinal .002/INCH Transverse .005/INCH
Flush Gage Reading, in. .001
Capacitance Gage Reading: 235

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3	+3	+3	+3.5	+3.5	+3.5	+3.5	+3.5	+3
#4	0	0	0	0	0	0	+1	0
#5	0	+1	+0.5	+1.5	+1	0	+1.5	+1

EFFECTS OF HOLE QUALITY

Test Series 9 Quality Variable SURFACE ROUGHNESS (125 μ in.)

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, (UNDERSIZE) Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND ~~10~~ IPM
Cutting Fluid: DRY Depth: (Ind. Reading) 1.952

Modify Good Holes Using Following Conditions:
Tool: MODIFIED L.H. SPIRAL PIN REAMER
Spindle, rpm 135 Feed: HAND - 3 IPM
Cutting Fluid: DRY Depth: (Ind. Reading) 1.288
Procedure: DRILL & C'SINK WITH UNDERSIZE REAMER THEN REAM WITH MODIFIED PIN REAMER USING MODERATE HAND FEED

Results: Specimen No. 2EGT Hole #1

Surface Finish, AA 80-120 μ in

Protrusion, in. .200

Perpendicularity, .001 in./gage length

Longitudinal 000 Transverse .005/INCH

Flush Gage Reading, in. .003

Capacitance Gage Reading: 215

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3	OPEN							
#4	0	0	0	0	0	0	0	0
#5	+1	+1	+1	+1	+1	+1	+1	+1

Hole #2

Surface Finish, AA 80-130 μ in

Protrusion, in. .192

Perpendicularity, .001 in./gage length

Longitudinal .004/INCH Transverse .001/INCH

Flush Gage Reading, in. .003

Capacitance Gage Reading: 220

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3	OPEN							
#4	0	+0.5	+0.5	0	0	0	0	0
#5	+1.5	+2	+1.5	+1.5	+1	+0.5	+0.5	+1

EFFECTS OF HOLE QUALITY

Test Series 9 Quality Variable SURFACE ROUGHNESS (125 μin.)

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, (UNDERSIZE) Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND ~~10~~ IPM
Cutting Fluid: DRY Depth: (Ind. Reading) 1.952

Modify Good Holes Using Following Conditions:
Tool: MODIFIED L.H. SPIRAL PIN REAMER
Spindle, rpm 135 Feed: HAND - 3 IPM
Cutting Fluid: DRY Depth: (Ind. Reading) 1.210
Procedure: DRILL & C'SINK WITH UNDERSIZE REAMER THEN REAM WITH MODIFIED PIN REAMER USING MODERATE HAND FEED

Results: Specimen No. 5A4CB Hole #1
Surface Finish, AA 100-140 μin
Protrusion, in. .208
Perpendicularity, .001 in./gage length
Longitudinal 0 Transverse .003/INCH
Flush Gage Reading, in. .003
Capacitance Gage Reading: 248

Bluing Pin Rollout

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3	+1	+0.5	+0.5	+0.5	+0.5	+0.5	+1	+1
#4	+1	+1	+1	+1	+0.5	+1	+1	+0.5
#5	+3.5	+3.5	+3	+3.5	+3	+3.5	+3	+3.5

Hole #2
Surface Finish, AA 95-120 μin
Protrusion, in. .195
Perpendicularity, .001 in./gage length
Longitudinal .001/INCH Transverse .001/INCH
Flush Gage Reading, in. .003
Capacitance Gage Reading: 295

Bluing Pin Rollout

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3	+1	+1	+1	+0.5	+0.5	+1	+1	+1
#4	+0.5	+1	+0.5	+1	+1	+1	+1	+1
#5	+2	+3	+2	+2.5	+2.5	+3	+3	+3.5

EFFECTS OF HOLE QUALITY

Test Series 9 Quality Variable SURFACE ROUGHNESS (250μ MAX.)

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, (UNDERSIZE) Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND ~~10~~ IPM
Cutting Fluid: DRY Depth: (Ind. Reading) 1.949

Modify Good Holes Using Following Conditions:
Tool: MODIFIED LH SPIRAL PIN REAMER
Spindle, rpm 135 Feed: HAND - 3 IPM
Cutting Fluid: DRY Depth: (Ind. Reading) 1.590
Procedure: DRILL & C'SINK WITH UNDERSIZE REAMER THEN REAM WITH MODIFIED PIN REAMER USING MODERATE HAND FEED

Results: Specimen No. 6A1T Hole #1

Bluing Pin Rollout

Surface Finish, AA 240-280 μ in
Protrusion, in. .230
Perpendicularity, .001 in./gage length
Longitudinal .003/INCH Transverse .005/INCH
Flush Gage Reading, in. .004
Capacitance Gage Reading: 190

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3	+ 1.5	+ 1.5	+ 1	+ 1	+ 1	+ 1	+ 1	+ 1
#4	+ 1	+ 1	+ 1	+ 1	+ 1	+ 1	+ 1	+ 1
#5	+ 3	+ 3	+ 2.5	+ 3	+ 2.5	+ 2.5	+ 2	+ 2

Hole #2

Bluing Pin Rollout

Surface Finish, AA 250-280 μ in
Protrusion, in. .236
Perpendicularity, .001 in./gage length
Longitudinal .001/INCH Transverse .006/INCH
Flush Gage Reading, in. .004
Capacitance Gage Reading: 186

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3	+ 1.5	+ 1	+ 1	+ 1.5	+ 1	+ 1	+ 1	+ 1.5
#4	+ 0.5	+ 1	+ 0.5	+ 0.5	+ 0.5	+ 1	+ 1	+ 1
#5	+ 3.5	+ 4	+ 3.5	+ 3.5	+ 3.5	+ 3.5	+ 3	+ 3

EFFECTS OF HOLE QUALITY

Test Series 9 Quality Variable SURFACE ROUGHNESS (250μ in.)

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, (UNDERSIZE) Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND-10 IPM
Cutting Fluid: DRY Depth: (Ind. Reading) 1.950

Modify Good Holes Using Following Conditions:
Tool: MODIFIED LH SPIRAL PIN REAMER
Spindle, rpm 135 Feed: HAND - 3 IPM
Cutting Fluid: DRY Depth: (Ind. Reading) 1.590
Procedure: DRILL & C'SINK WITH UNDERSIZE REAMER THEN REAM WITH MODIFIED PIN REAMER USING MODERATE HAND FEED

Results: Specimen No. 3B4L Hole #1
Surface Finish, AA 220-280 μin.
Protrusion, in. .205
Perpendicularity, .001 in./gage length
Longitudinal .001/INCH Transverse .005/INCH
Flush Gage Reading, in. .001
Capacitance Gage Reading: 189

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3	+3	+3	+3	+3	+2.5	+3	+3.5	+3.5
#4	+1.5	+2	+2	+2	+1.5	+1.5	+1.5	+1.5
#5	+1	+1	+1	+1	+1	+1	+0.5	+1

Hole #2

Surface Finish, AA 220-270 μin.
Protrusion, in. .205
Perpendicularity, .001 in./gage length
Longitudinal .003/INCH Transverse .001/INCH
Flush Gage Reading, in. .001
Capacitance Gage Reading: 170

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3	+2	+2.5	+3	+4	+4	+4.5	+5	+4
#4	+1.5	+2	+2	+2	+2	+2	+2	+1.5
#5	+3	+1	+0.5	+0.5	+1	+1	+1	+0.5

EFFECTS OF HOLE QUALITY

Test Series 9 Quality Variable Surface Roughness (250 μin.)

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5) (UNDERSIZE)
Spindle, rpm 325 Feed: HAND 10 IPM
Cutting Fluid: DRY Depth: (Ind. Reading) 1.949

Modify Good Holes Using Following Conditions:
Tool: MODIFIED LH SPIRAL PIN REAMER
Spindle, rpm 135 Feed: HAND - 3 IPM
Cutting Fluid: DRY Depth: (Ind. Reading) 1.590
Procedure: DRILL & C'SINK WITH UNDERSIZE REAMER THEN REAM WITH MODIFIED PIN REAMER USING MODERATE HAND FEED

Results: Specimen No. 4E2B Hole #1
Surface Finish, AA 250-300 μin
Protrusion, in. .203
Perpendicularity, .001 in./gage length
Longitudinal .002/INCH Transverse .002/INCH
Flush Gage Reading, in. .004
Capacitance Gage Reading: 190

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3	+1	+1.5	+1.5	+1.5	+1	+1	+1.5	+1.5
#4	+1	+1	+0.5	+0.5	0	+0.5	+0.5	+1
#5	+4	+3.5	+3	+2	+2	+2.5	+2	+2

Hole #2
Surface Finish, AA 360-380 μin
Protrusion, in. .200
Perpendicularity, .001 in./gage length
Longitudinal .003/INCH Transverse .003/INCH
Flush Gage Reading, in. .004
Capacitance Gage Reading: 197

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3	+1	+0.5	+1	+1	+1	+1	+1.5	+1
#4	+0.5	+0.5	+0.5	+0.5	+0.5	+1	+0.5	+1
#5	+2.5	+2	+2	+2	+2	+2	+2	+1

EFFECTS OF HOLE QUALITY

Test Series 9 Quality Variable SURFACE ROUGHNESS (250 μin.)

Produce Good Hole Using Following Conditions:
Tools. #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5) (UNDERSIZE)
Spindle, rpm 325 Feed: HAND ~~10~~ IPM
Cutting Fluid: DRY Depth: (Ind. Reading) 1.949

Modify Good Holes Using Following Conditions:
Tool: MODIFIED LH SPIRAL PIN REAMER
Spindle, rpm 135 Feed: HAND 3 IPM
Cutting Fluid: DRY Depth: (Ind. Reading) .590
Procedure: DRILL & C'SINK WITH UNDERSIZE REAMER THEN REAM WITH MODIFIED PIN REAMER USING MINIMAL HAND FEED

Results: Specimen No. 2E2T Hole #1
Surface Finish, AA 240-280 μin Bluing Pin Rollout
Protrusion, in. .191
Perpendicularity, .001 in./gage length
Longitudinal .001/INCH Transverse .006/INCH
Flush Gage Reading, in. .004
Capacitance Gage Reading: 253

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3	+2	+2	+2.5	+2	+1.5	+1.5	+2	+1.5
#4	0	+0.5	+0.5	+0.5	+0.5	+0.5	+0.5	0
#5	0	+0.5	0	+1	0	0	+0.5	0

Hole #2

Surface Finish, AA 220-260 μin Bluing Pin Rollout
Protrusion, in. .223
Perpendicularity, .001 in./gage length
Longitudinal .002/INCH Transverse .006/INCH
Flush Gage Reading, in. .004
Capacitance Gage Reading: 196

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3	+1.5	+1.5	+1.5	+2	+1.5	+2	+2	+2.5
#4	+1	+0.5	+0.5	+1	+0.5	+1	+1	+1
#5	+1	+0.5	0	+0.5	+0.5	+0.5	+1	+1

EFFECTS OF HOLE QUALITY

Test Series 9 Quality Variable SURFACE ROUGHNESS (250 μin.)

Produce Good Hole Using Following Conditions:

Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5) (UNDERSIZE)

Spindle, rpm 325 Feed: HAND 10 IPM

Cutting Fluid: DRY Depth: (Ind. Reading) 1.950

Modify Good Holes Using Following Conditions:

Tool: MODIFIED L.H. SPIRAL PIN REAMER

Spindle, rpm 135 Feed: HAND - 3 IPM

Cutting Fluid: DRY Depth: (Ind. Reading) 1.570

Procedure: DRILL & C'SINK WITH UNDERSIZE REAMER THEN REAM WITH MODIFIED PIN REAMER USING MODERATE HAND FEED

Results: Specimen No. 383B Hole #1

Surface Finish, AA 140-200 μin

Protrusion, in. .192

Perpendicularity, .001 in./gage length

Longitudinal .001/INCH Transverse .010/INCH

Flush Gage Reading, in. .002

Capacitance Gage Reading: 199

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
	Angular Position							
Bottom #1								
#2								
#3	+0.5	+0.5	+1	+1	+1	0	+1	+1
#4	+1.5	+1	+1	+1.5	+1.5	+2	+1.5	+1.5
#5	+3	+2.5	+3	+3.5	+3.5	+3.5	+3	+3.5

Hole #2

Surface Finish, AA 140-200 μin

Protrusion, in. .190

Perpendicularity, .001 in./gage length

Longitudinal .001/INCH Transverse .018/INCH

Flush Gage Reading, in. .004

Capacitance Gage Reading: 190

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
	Angular Position							
Bottom #1								
#2								
#3	+1	+1	+1	+0.5	+1	+1	0	0
#4	+2.5	+2	+1.5	+1	+1.5	+1	+1.5	+1.5
#5	+3	+2.5	+2.5	+3.5	+4	+3	+3	+2.5

EFFECTS OF HOLE QUALITY

Test Series 9 Quality Variable SURFACE ROUGHNESS (250 μin.)

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, (UNDERSIZE) Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND 10 IPM
Cutting Fluid: DRY Depth: (Ind. Reading) 1.950

Modify Good Holes Using Following Conditions:
Tool: MODIFIED LH. SPIRAL PIN REAMER
Spindle, rpm 135 Feed: HAND - 3 IPM
Cutting Fluid: DRY Depth: (Ind. Reading) 1.590
Procedure: DRILL & C'SINK WITH UNDERSIZE REAMER THEN REAM WITH MODIFIED PIN REAMER USING MODERATE HAND FEED

Results: Specimen No. 4A6B Hole #1
Surface Finish, AA 250-280 μ in
Protrusion, in. .220
Perpendicularity, .001 in./gage length
Longitudinal .002/INCH Transverse .003/INCH
Flush Gage Reading, in. .003
Capacitance Gage Reading: 241

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
	Angular Position							
Bottom #1								
#2								
#3	+2	+2	+2	+2	+2	+2	+2	+2
#4	+1	+1	+0.5	+0.5	+0.5	+0.5	+0.5	+0.5
#5	+0.5	+1	+1	+0.5	+1	+1	+0.5	+0.5

Hole #2
Surface Finish, AA 240-280 μ in
Protrusion, in. .225
Perpendicularity, .001 in./gage length
Longitudinal .001/INCH Transverse 0
Flush Gage Reading, in. .003
Capacitance Gage Reading: 193

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
	Angular Position							
Bottom #1								
#2								
#3	+1	+1	+1	+1	+1.5	+1.5	+1.5	+1
#4	+1	+1	+1	+1	+1	+1	+1	+1
#5	+3	+3	+2.5	+2.5	+2.5	+2	+2	+1.5

EFFECTS OF HOLE QUALITY

Test Series 9 Quality Variable SURFACE ROUGHNESS (250 μ in.)

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, (UNDERSIZE) Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND-10 IPM
Cutting Fluid: DRY Depth: (Ind. Reading) 1.950

Modify Good Holes Using Following Conditions:
Tool: MODIFIED LH SPIRAL PIN REAMER
Spindle, rpm 135 Feed: HAND - 3 IPM
Cutting Fluid: DRY Depth: (Ind. Reading) 1.590
Procedure: DRILL & C'SINK WITH UNDERSIZE REAMER THEN REAM WITH MODIFIED PIN REAMER USING MODERATE HAND FEED

Results: Specimen No. 5E3CB **Hole #1** Bluing Pin Rollout
Surface Finish, AA 220-260 μ in
Protrusion, in. .210
Perpendicularity, .001 in./gage length
Longitudinal 0 Transverse 0
Flush Gage Reading, in. .001
Capacitance Gage Reading: 171

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3	+1	+1	+1.5	+1	+1	+1	+1	+1
#4	+0.5	+1	+0.5	0	0	+0.5	0	+1
#5	+4.5	+4	+4	+4	+3	+3	+3	+3

Hole #2 Bluing Pin Rollout
Surface Finish, AA 240-280 μ in
Protrusion, in. .210
Perpendicularity, .001 in./gage length
Longitudinal .002/INCH Transverse .003/INCH
Flush Gage Reading, in. .002
Capacitance Gage Reading: 185

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3	+1	+1	+1.5	+1	+1	+1	+1	+1
#4	0	0	+0.5	+1	+0.5	+0.5	+0.5	+0.5
#5	+4	+4	+3.5	+3.5	+3	+3	+3	+3

EFFECTS OF HOLE QUALITY

Test Series 9 Quality Variable SURFACE ROUGHNESS (250μin.)

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, (UNDERSIZE) Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND ~~1.0~~ IPM
Cutting Fluid: DRY Depth: (Ind. Reading) 1.950

Modify Good Holes Using Following Conditions:
Tool: MODIFIED LH SPIRAL PIN REAMER
Spindle, rpm 135 Feed: HAND - 3 IPM
Cutting Fluid: DRY Depth: (Ind. Reading) 1.590
Procedure: DRILL & C'SINK WITH UNDERSIZE REAMER THEN REAM WITH MODIFIED PIN REAMER USING MODERATE HAND FEED

Results: Specimen No. 5A4C7 Hole #1
Surface Finish, AA 250-280 μin. Bluing Pin Rollout
Protrusion, in. .240
Perpendicularity, .001 in./gage length
Longitudinal .003/INCH Transverse .001/INCH
Flush Gage Reading, in. .003
Capacitance Gage Reading: 245

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3	+1.5	+2	+2	+2	+1.5	+2	+2	+2
#4	+1	+1	+1.5	+1	+1	+1	+1	+1
#5	+2.5	+2.5	+3.5	+2.5	+3	+2.5	+2	+2

Hole #2
Surface Finish, AA 180-260 μin. Bluing Pin Rollout
Protrusion, in. .242
Perpendicularity, .001 in./gage length
Longitudinal .003/INCH Transverse .002/INCH
Flush Gage Reading, in. .002
Capacitance Gage Reading: 249

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3	+1	+0.5	+1.5	+1.5	+1	+1	0	0
#4	+0.5	+0.5	+1	+1	+0.5	+1	+0.5	0
#5	+4	+4	+4	+4	+4	+4	+4	4

EFFECTS OF HOLE QUALITY

Test Series 9 Quality Variable SURFACE ROUGHNESS (250 μin.)

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, (UNDERSIZE) Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND ~~1.0~~ IPM
Cutting Fluid: DRY Depth: (Ind. Reading) 1.949

Modify Good Holes Using Following Conditions:
Tool: MODIFIED LH SPIRAL PIN REAMER
Spindle, rpm 135 Feed: HAND - 3 IPM
Cutting Fluid: DRY Depth: (Ind. Reading) 1.590
Procedure: DRILL & C'SINK WITH UNDERSIZE REAMER THEN REAM WITH MODIFIED PIN REAMER USING MODERATE HAND FEED

Results: Specimen No. 4D3T Hole #1

Surface Finish, AA 200-240 μin
Protrusion, in. .216
Perpendicularity, .001 in./gage length
Longitudinal .001/INCH Transverse .001/INCH
Flush Gage Reading, in. .004
Capacitance Gage Reading: 169

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3	+1	+1.5	+1.5	+1	+1	+1	+1	+1
#4	+1	+1.5	+0.5	+1	+0.5	+0.5	+0.5	+2.5
#5	+4	+3.5	+3	+3	+3	+3	+3	+3

Hole #2

Surface Finish, AA 240-260 μin
Protrusion, in. .204
Perpendicularity, .001 in./gage length
Longitudinal .002/INCH Transverse .002/INCH
Flush Gage Reading, in. .004
Capacitance Gage Reading: 220

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3	+1	+0.5	+1	+1	+1	+1	+1	+1
#4	0	+0.5	+0.5	+0.5	+0.5	+0.5	+0.5	+0.5
#5	+3	+3	+3.5	+3.5	+2.5	+2.5	+2.5	+2.5

EFFECTS OF HOLE QUALITY

Test Series 9 Quality Variable SURFACE ROUGHNESS (250 μin.)

Produce Good Hole Using Following Conditions:

Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, (UNDERSIZE) Omark Drill Reamer (TLD2040AR1-5)

Spindle, rpm 325 Feed: HAND - 10 IPM

Cutting Fluid: DRY Depth: (Ind. Reading) 1.950

Modify Good Holes Using Following Conditions:

Tool: MODIFIED L.H. SPIRAL PIN REAMER

Spindle, rpm 135 Feed: HAND - 3 IPM

Cutting Fluid: DRY Depth: (Ind. Reading) 1.590

Procedure: DRILL & C'SINK WITH UNDERSIZE REAMER THEN REAM WITH MODIFIED PIN REAMER USING MODERATE HAND FEED

Results: Specimen No. 2A5T Hole #1

Surface Finish, AA 240-300 μin

Protrusion, in. .210

Perpendicularity, .001 in./gage length

Longitudinal .004/INCH Transverse .002/INCH

Flush Gage Reading, in. .004

Capacitance Gage Reading: 225

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3	+1	+1	+0.5	+1	+1	+1	+1	+1
#4	+2.5	+1	+1	+2.5	+2.5	+2	+2	+2
#5	+2.5	+2.5	+2.5	+2	+2.5	+2	+1	+2.5

Hole #2

Surface Finish, AA 240-300 μin

Protrusion, in. .220

Perpendicularity, .001 in./gage length

Longitudinal .002/INCH Transverse .006/INCH

Flush Gage Reading, in. .004

Capacitance Gage Reading: 234

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3	+0.5	+0.5	0	+0.5	0	0	1	1
#4	+3	+3.5	+2.5	+2	+3	+3	+3	+2.5
#5	+3.5	+2	+4	+3.5	+4	+4	+4	+3.5

INSPECTION SHEETS FOR TEST SERIES 10 - RIFLING

EFFECTS OF HOLE QUALITY

Test Series 10 Quality Variable RIFLING

Produce Good Hole Using Following Conditions:

Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)

Spindle, rpm 325 Feed: HAND - 0.5 IPM

Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.952

Modify Good Holes Using Following Conditions:

Tool: MODIFIED 2 FLUTE #6 TAPER PIN REAMER - LH SPIRAL

Spindle, rpm 0 Feed: HAND

Cutting Fluid: DRY Depth: (Ind. Reading)

Procedure: REAM GOOD HOLE THEN THRUST TAPER PIN REAMER INTO HOLE WITHOUT ROTATING .400"-.500" DEEP AFTER TOUCHUP

Results: Specimen No. 2C4B Hole #1

Surface Finish, AA 40-50 μ in

Protrusion, in. .183

Perpendicularity, .001 in./gage length

Longitudinal .005/INCH Transverse .004/INCH

Flush Gage Reading, in. .003

Capacitance Gage Reading: 386

Depth of Rifle, in. .005

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3	0	0	0	0	0	0	0	0
#4	+0.5	+0.5	+1	+0.5	±0.5	0	+0.5	+0.5
#5	+1.5	+1.5	+1.5	+2	+2	+1.5	+1.5	+1.5

Hole #2

Surface Finish, AA 35-45 μ in

Protrusion, in. .195

Perpendicularity, .001 in./gage length

Longitudinal .002/INCH Transverse .001/INCH

Flush Gage Reading, in. .003

Capacitance Gage Reading: 315

Depth of Rifle, in. .005

Bluing Pin Rollout

90%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	0	0	0	0	0	0	+0.5	0
#5	0	0	0	0	0	0	0	0

EFFECTS OF HOLE QUALITY

Test Series 10 Quality Variable RIFLING

Produce Good Hole Using Following Conditions:

Tools: #2 Centerdrill; 19/64 in. pilot drill; Group I, Omark Drill Reamer (TLD2040AR1-5)

Spindle, rpm 325 Feed: HAND - 0.5 IPM

Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.952

Modify Good Holes Using Following Conditions:

Tool: MODIFIED 2 FLUTE #6 TAPER PIN REAMER - LH SPIRAL

Spindle, rpm 0 Feed: HAND

Cutting Fluid: DRY Depth: (Ind. Reading)

Procedure: REAM GOOD HOLE THEN THRUST TAPER PIN REAMER INTO HOLE WITHOUT ROTATING .400"-.500" DEEP AFTER TOUCHUP

Results: Specimen No. 5EST Hole #1

Surface Finish, AA 55-65 μin

Protrusion, in. .185

Perpendicularity, .001 in./gage length

Longitudinal .002/INCH Transverse .000

Flush Gage Reading, in. .002

Capacitance Gage Reading: 290

Depth of Rifle, in. .005

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
	Angular Position							
Bottom #1	–							
#2	–							
#3	–							
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0

Hole #2

Surface Finish, AA 55-70 μin

Protrusion, in. .186

Perpendicularity, .001 in./gage length

Longitudinal .001/INCH Transverse .004/INCH

Flush Gage Reading, in. .003

Capacitance Gage Reading: 331

Depth of Rifle, in. .005

Bluing Pin Rollout

80%

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
	Angular Position							
Bottom #1								
#2								
#3								
#4	0	0	0	0	0	0	0	0
#5	+1	+1	+1	+1	+1	+1	+1	+1

EFFECTS OF HOLE QUALITY

Test Series 10 Quality Variable RIFLING

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.952

Modify Good Holes Using Following Conditions:
Tool: MODIFIED 2 FLUTE #6 TAPER PIN REAMER - LH. SPIRAL
Spindle, rpm 0 Feed: HAND
Cutting Fluid: DRY Depth: (Ind. Reading)
Procedure: REAM GOOD HOLE THEN THRUST TAPER PIN REAMER INTO HOLE WITHOUT ROTATING .400"-.500" DEEP AFTER TOUCHUP

Results: Specimen No. 2E3T Hole #1

Surface Finish, AA 25-35 μ in
Protrusion, in. .181
Perpendicularity, .001 in./gage length
Longitudinal .002/INCH Transverse .003/INCH
Flush Gage Reading, in. .002
Capacitance Gage Reading: 381
Depth of Rifle, in. .004

Bluing Pin Rollout

90%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0

Hole #2

Surface Finish, AA 28-35 μ in
Protrusion, in. .183
Perpendicularity, .001 in./gage length
Longitudinal .001/INCH Transverse .002/INCH
Flush Gage Reading, in. .003
Capacitance Gage Reading: 372
Depth of Rifle, in. .004

Bluing Pin Rollout

90%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0

EFFECTS OF HOLE QUALITY

Test Series 10 Quality Variable RIFLING

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND-0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.952

Modify Good Holes Using Following Conditions:
Tool: MODIFIED 2 FLUTE #6 TAPER PIN REAMER - LH. SPIRAL
Spindle, rpm 0 Feed: HAND
Cutting Fluid: DRY Depth: (Ind. Reading)
Procedure: REAM GOOD HOLE THEN THRUST TAPER PIN REAMER INTO HOLE WITHOUT ROTATING .400"-.500" DEEP AFTER TOUCHUP

Results: Specimen No. 2E5T

Hole #1

Surface Finish, AA 40-50 μin
Protrusion, in. .182
Perpendicularity, .001 in./gage length
Longitudinal 000 Transverse .004/INCH
Flush Gage Reading, in. .002
Capacitance Gage Reading: 303
Depth of Rifle, in. .004

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0

Hole #2

Surface Finish, AA 35-45 μin
Protrusion, in. .183
Perpendicularity, .001 in./gage length
Longitudinal .002/INCH Transverse .002/INCH
Flush Gage Reading, in. .002
Capacitance Gage Reading: 371
Depth of Rifle, in. .004

Bluing Pin Rollout

80%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0

EFFECTS OF HOLE QUALITY

Test Series 10 Quality Variable RIFLING

Produce Good Hole Using Following Conditions:

Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.952

Modify Good Holes Using Following Conditions:

Tool: MODIFIED 2 FLUTE #6 TAPER PIN REAMER - LH. SPIRAL
Spindle, rpm 0 Feed: HAND
Cutting Fluid: DRY Depth: (Ind. Reading)
Procedure: REAM GOOD HOLE THEN THRUST TAPER PIN REAMER INTO HOLE WITHOUT ROTATING .400"-.500" DEEP AFTER TOUCHUP

Results: Specimen No. 4E6B Hole #1

Surface Finish, AA 18-25 μ in
Protrusion, in. .167
Perpendicularity, .001 in./gage length
Longitudinal 000 Transverse .004/INCH
Flush Gage Reading, in. .001
Capacitance Gage Reading: 365
Depth of Rifle, in. .004

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0

Hole #2

Surface Finish, AA 15-22 μ in
Protrusion, in. .181
Perpendicularity, .001 in./gage length
Longitudinal .002/INCH Transverse 000
Flush Gage Reading, in. .001
Capacitance Gage Reading: 383
Depth of Rifle, in. .004

Bluing Pin Rollout

80%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0

EFFECTS OF HOLE QUALITY

Test Series 10 Quality Variable RIFLING

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.952

Modify Good Holes Using Following Conditions:
Tool: MODIFIED 2 FLUTE #6 TAPER PIN REAMER - LH. SPIRAL
Spindle, rpm 0 Feed: HAND
Cutting Fluid: DRY Depth: (Ind. Reading)
Procedure: REAM GOOD HOLE THEN THRUST TAPER PIN REAMER INTO HOLE WITHOUT ROTATING .400"-.500" DEEP AFTER TOUCHUP

Results: Specimen No. 2B4T Hole #1
Surface Finish, AA 15-25 μin
Protrusion, in. .174
Perpendicularity, .001 in./gage length
Longitudinal .001/INCH Transverse .000
Flush Gage Reading, in. .002
Capacitance Gage Reading: 358
Depth of Rifle, in. .004

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0

Hole #2

Surface Finish, AA 18-22 μin
Protrusion, in. .172
Perpendicularity, .001 in./gage length
Longitudinal .001/INCH Transverse .003/INCH.
Flush Gage Reading, in. .003
Capacitance Gage Reading: 352
Depth of Rifle, in. .004

Bluing Pin Rollout

80%

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0

EFFECTS OF HOLE QUALITY

Test Series 10 Quality Variable RIFLING

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.952

Modify Good Holes Using Following Conditions:
Tool: MODIFIED 2 FLUTE #6 TAPER PIN REAMER - LH SPIRAL
Spindle, rpm 0 Feed: HAND
Cutting Fluid: DRY Depth: (Ind. Reading)
Procedure: REAM GOOD HOLE THEN THRUST TAPER PIN REAMER INTO HOLE WITHOUT ROTATING .400"-.500" DEEP AFTER TOUCH UP

Results: Specimen No. 3B2B Hole #1
Surface Finish, AA 40-60 μ in
Protrusion, in. .183
Perpendicularity, .001 in./gage length
Longitudinal .001/INCH Transverse .001/INCH
Flush Gage Reading, in. .003
Capacitance Gage Reading: 382
Depth of Rifle, in. .004

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0

Hole #2

Surface Finish, AA 35-95 μ in
Protrusion, in. .180
Perpendicularity, .001 in./gage length
Longitudinal .000 Transverse .024/INCH
Flush Gage Reading, in. .003
Capacitance Gage Reading: 392
Depth of Rifle, in. .004

Bluing Pin Rollout

80%

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0

EFFECTS OF HOLE QUALITY

Test Series 10 Quality Variable RIFLING

Produce Good Hole Using Following Conditions:

Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)

Spindle, rpm 325 Feed: HAND-0.5 IPM

Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.952

Modify Good Holes Using Following Conditions:

Tool: MODIFIED 2 FLUTE #6 TAPER PIN REAMER - LH SPIRAL

Spindle, rpm 0 Feed: HAND

Cutting Fluid: DRY Depth: (Ind. Reading)

Procedure: REAM GOOD HOLE THEN THRUST TAPER PIN REAMER INTO HOLE WITHOUT ROTATING .400"-.500" DEEP AFTER TOUCHUP

Results: Specimen No. 2B1T Hole #1

Surface Finish, AA 25-35 μ in

Protrusion, in. .174

Perpendicularity, .001 in./gage length

Longitudinal .002/INCH Transverse .003/INCH

Flush Gage Reading, in. .002

Capacitance Gage Reading: 378

Depth of Rifle, in. .004

Bluing Pin Rollout

80%

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0

Hole #2

Surface Finish, AA 22-38 μ in

Protrusion, in. .175

Perpendicularity, .001 in./gage length

Longitudinal 000 Transverse 000

Flush Gage Reading, in. .002

Capacitance Gage Reading: 374

Depth of Rifle, in. .004

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0

EFFECTS OF HOLE QUALITY

Test Series 10 Quality Variable RIFLING

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND-0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.952

Modify Good Holes Using Following Conditions:
Tool: MODIFIED 2 FLUTE #6 TAPER PIN REAMER- LH. SPIRAL
Spindle, rpm 0 Feed: HAND
Cutting Fluid: DRY Depth: (Ind. Reading)
Procedure: REAM GOOD HOLE THEN THRUST TAPER PIN REAMER INTO HOLE WITHOUT ROTATING .400"-.500" DEEP AFTER TOUCHUP

Results: Specimen No. 3R6T Hole #1

Surface Finish, AA 22-30 μ in
Protrusion, in. .175
Perpendicularity, .001 in./gage length
Longitudinal .003/INCH Transverse .001/INCH
Flush Gage Reading, in. .002
Capacitance Gage Reading: 390
Depth of Rifle, in. .004

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0

Hole #2

Surface Finish, AA 18-25 μ in
Protrusion, in. .173
Perpendicularity, .001 in./gage length
Longitudinal .003/INCH Transverse .001/INCH
Flush Gage Reading, in. .003
Capacitance Gage Reading: 390
Depth of Rifle, in. .004

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0

EFFECTS OF HOLE QUALITY

Test Series 10 Quality Variable RIFLING

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND-0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.952

Modify Good Holes Using Following Conditions:
Tool: MODIFIED 2 FLUTE #6 TAPER PIN REAMER - LH. SPIRAL
Spindle, rpm 0 Feed: HAND
Cutting Fluid: DRY Depth: (Ind. Reading)
Procedure: REAM GOOD HOLE THEN THRUST TAPER PIN REAMER INTO HOLE WITHOUT ROTATING .400"-.500" DEEP AFTER TOUCH UP

Results: Specimen No. 2B3E Hole #1
Surface Finish, AA 25-35 μin
Protrusion, in. .177
Perpendicularity, .001 in./gage length
Longitudinal .003/INCH Transverse .002/INCH
Flush Gage Reading, in. .002
Capacitance Gage Reading: 401
Depth of Rifle, in. .005

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0

Hole #2
Surface Finish, AA 20-30 μin
Protrusion, in. .175
Perpendicularity, .001 in./gage length
Longitudinal .002/INCH Transverse .001/INCH
Flush Gage Reading, in. .C 4
Capacitance Gage Reading: 395
Depth of Rifle, in. .004

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0

INSPECTION SHEETS FOR TEST SERIES 11 - AXIAL SCRATCHES

EFFECTS OF HOLE QUALITY

Test Series 11 Quality Variable SCRATCHES - AXIAL

Produce Good Hole Using Following Conditions:

Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)

Spindle, rpm 325 Feed: HAND - 0.5 IPM

Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.952

Modify Good Holes Using Following Conditions:

Tool: SPECIAL BORING BAR WITH 60° SHARP POINTED INSERT

Spindle, rpm 0 Feed: HAND

Cutting Fluid: DRY Depth: (Ind. Reading)

Procedure: REAM GOOD HOLE, THEN INSERT BORING BAR AND TOUCH UP AT BOTTOM OF HOLE, CHECK ANGULAR POSITION AND MOVE RADIALLY .005", THEN RETRACT STRAIGHT OUT

Results: Specimen No. 4A2B Hole #1

Surface Finish, AA 38-55 μ in

Protrusion, in. .173

Perpendicularity, .001 in./gage length

Longitudinal .002/INCH Transverse .001/INCH

Flush Gage Reading, in. .002

Capacitance Gage Reading: 359

Depth of Scratch, in. .005

Bluing Pin Rollout

80%

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0

Hole #2

Surface Finish, AA 28-38 μ in

Protrusion, in. .169

Perpendicularity, .001 in./gage length

Longitudinal .002/INCH Transverse .005/INCH

Flush Gage Reading, in. .002

Capacitance Gage Reading: 370

Depth of Scratch, in. .005

Bluing Pin Rollout

90%

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0

EFFECTS OF HOLE QUALITY

Test Series 11 Quality Variable SCRATCHES - AXIAL

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.952

Modify Good Holes Using Following Conditions:
Tool: SPECIAL BORING BAR WITH 60° SHARP POINTED INSERT
Spindle, rpm 0 Feed: HAND
Cutting Fluid: DRY Depth: (Ind. Reading)
Procedure: REAM GOOD HOLE, THEN INSERT BORING BAR AND TOUCH UP AT BOTTOM OF HOLE, CHECK ANGULAR POSITION AND MOVE RADIALLY .005", THEN RETRACT STRAIGHT OUT

Results: Specimen No. 3D1T Hole #1
Surface Finish, AA 35-38 μ in
Protrusion, in. .168
Perpendicularity, .001 in./gage length
Longitudinal .003/INCH Transverse .001/INCH
Flush Gage Reading, in. .002
Capacitance Gage Reading: 380
Depth of Scratch, in. .007

Bluing Pin Rollout

80%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0

Hole #2
Surface Finish, AA 45-50 μ in
Protrusion, in. .170
Perpendicularity, .001 in./gage length
Longitudinal .001/INCH Transverse .001/INCH
Flush Gage Reading, in. .002
Capacitance Gage Reading: 357
Depth of Scratch, in. .007

Bluing Pin Rollout

90%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0

EFFECTS OF HOLE QUALITY

Test Series 11 Quality Variable SCRATCHES - AXIAL

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.952

Modify Good Holes Using Following Conditions:
Tool: SPECIAL BORING BAR WITH 60° SHARP POINTED INSERT
Spindle, rpm 0 Feed: HAND
Cutting Fluid: DRY Depth: (Ind. Reading)
Procedure: REAM GOOD HOLE, THEN INSERT BORING BAR AND TOUCH UP AT BOTTOM OF HOLE, CHECK ANGULAR POSITION AND MOVE RADIALLY .005", THEN RETRACT STRAIGHT OUT

Results: Specimen No. 3D2T . Hole #1
Surface Finish, AA 30-40 μ in
Protrusion, in. .169
Perpendicularity, .001 in./gage length
Longitudinal .001/INCH Transverse .001/INCH
Flush Gage Reading, in. .001
Capacitance Gage Reading: 379
Depth of Scratch, in. .005

Bluing Pin Rollout
80%

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
	Angular Position							
Bottom #1								
#2								
#3								
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0

Hole #2
Surface Finish, AA 35-45 μ in
Protrusion, in. .177
Perpendicularity, .001 in./gage length
Longitudinal .001/INCH Transverse .001/INCH
Flush Gage Reading, in. .001
Capacitance Gage Reading: 359
Depth of Scratch, in. .007

Bluing Pin Rollout
70%

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
	Angular Position							
Bottom #1								
#2								
#3								
#4	0	0	0	0	0	0	0	0
#5	0	+0.5	+1	+1	+0.5	+0.5	+0.5	+1

EFFECTS OF HOLE QUALITY

Test Series 11 Quality Variable SCRATCHES – AXIAL

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND – 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.952

Modify Good Holes Using Following Conditions:
Tool: SPECIAL BORING BAR WITH 60° SHARP POINTED INSERT
Spindle, rpm 0 Feed: HAND
Cutting Fluid: DRY Depth: (Ind. Reading)
Procedure: REAM GOOD HOLE, THEN INSERT BORING BAR AND TOUCH UP AT BOTTOM OF HOLE, CHECK ANGULAR POSITION AND MOVE RADIALLY .005", THEN RETRACT STRAIGHT OUT

Results: Specimen No. 4B1T Hole #1
Surface Finish, AA 38-42 μ in
Protrusion, in. .171
Perpendicularity, .001 in./gage length
Longitudinal .001/INCH Transverse .002/INCH
Flush Gage Reading, in. .003
Capacitance Gage Reading: 371
Depth of Scratch, in. .005

Bluing Pin Rollout

80%

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0

Hole #2
Surface Finish, AA 25-36 μ in
Protrusion, in. .170
Perpendicularity, .001 in./gage length
Longitudinal .002/INCH Transverse .004/INCH
Flush Gage Reading, in. .003
Capacitance Gage Reading: 375
Depth of Scratch, in. .006

Bluing Pin Rollout

80%

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0

EFFECTS OF HOLE QUALITY

Test Series 11 Quality Variable SCRATCHES - AXIAL

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.952

Modify Good Holes Using Following Conditions:
Tool: SPECIAL BORING BAR WITH 60° S[illegible] POINTED INSERT
Spindle, rpm 0 Feed: HAND
Cutting Fluid: DRY Depth: (Ind. Reading)
Procedure: REAM GOOD HOLE, THEN INSERT BORING BAR AND TOUCH UP AT BOTTOM OF HOLE, CHECK ANGULAR POSITION AND MOVE RADIALLY .005", THEN RETRACT STRAIGHT OUT

Results: Specimen No. 5C4B Hole #1
Surface Finish, AA 30-50 μ in
Protrusion, in. .172
Perpendicularity, .001 in./gage length
Longitudinal .003/INCH Transverse .002/INCH
Flush Gage Reading, in. .004
Capacitance Gage Reading: 362
Depth of Scratch, in. .005

Bluing Pin Rollout

90%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0

Hole #2
Surface Finish, AA 40-50 μ in
Protrusion, in. .173
Perpendicularity, .001 in./gage length
Longitudinal .003/INCH Transverse .001/INCH
Flush Gage Reading, in. .002
Capacitance Gage Reading: 373
Depth of Scratch, in. .005

Bluing Pin Rollout

80%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0

EFFECTS OF HOLE QUALITY

Test Series 11 Quality Variable SCRATCHES - AXIAL

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.952

Modify Good Holes Using Following Conditions:
Tool: SPECIAL BORING BAR WITH 60° SHARP POINTED INSERT
Spindle, rpm 0 Feed: HAND
Cutting Fluid: DRY Depth: (Ind. Reading)
Procedure: REAM GOOD HOLE, THEN INSERT BORING BAR AND TOUCH UP AT BOTTOM OF HOLE, CHECK ANGULAR POSITION AND MOVE RADIALLY .005", THEN RETRACT STRAIGHT OUT

Results: Specimen No. 2A3T Hole #1
Surface Finish, AA 35-45 μin
Protrusion, in. .171
Perpendicularity, .001 in./gage length
Longitudinal .002/INCH Transverse .002/INCH
Flush Gage Reading, in. .002
Capacitance Gage Reading: 370
Depth of Scratch, in. .006

Bluing Pin Rollout

90%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0

Hole #2
Surface Finish, AA 38-45 μin
Protrusion, in. .168
Perpendicularity, .001 in./gage length
Longitudinal .002/INCH Transverse .003/INCH
Flush Gage Reading, in. .002
Capacitance Gage Reading: 380
Depth of Scratch, in. .005

Bluing Pin Rollout

90%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0

EFFECTS OF HOLE QUALITY

Test Series 11 Quality Variable SCRATCHES - AXIAL

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND - c. 5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.952

Modify Good Holes Using Following Conditions:
Tool: SPECIAL BORING BAR WITH 60° SHARP POINTED INSERT
Spindle, rpm 0 Feed: HAND
Cutting Fluid: DRY Depth: (Ind. Reading)
Procedure: REAM GOOD HOLE, THEN INSERT BORING BAR AND TOUCH UP AT BOTTOM OF HOLE, CHECK ANGULAR POSITION AND MOVE RADIALLY .005", THEN RETRACT STRAIGHT OUT

Results: Specimen No. 4C1T Hole #1
Surface Finish, AA 38-44 μin
Protrusion, in. .171
Perpendicularity, .001 in./gage length
Longitudinal .004/INCH Transverse .002/INCH
Flush Gage Reading, in. .003
Capacitance Gage Reading: 375
Depth of Scratch, in. .007

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0

Hole #2

Surface Finish, AA 35-45 μin
Protrusion, in. .168
Perpendicularity, .001 in./gage length
Longitudinal .002/INCH Transverse .003/INCH
Flush Gage Reading, in. .002
Capacitance Gage Reading: 362
Depth of Scratch, in. .006

Bluing Pin Rollout

80%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0

EFFECTS OF HOLE QUALITY

Test Series 11 Quality Variable SCRATCHES - AXIAL

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.952

Modify Good Holes Using Following Conditions:
Tool: SPECIAL BORING BAR WITH 60° SHARP POINTED INSERT
Spindle, rpm 0 Feed: HAND
Cutting Fluid: DRY Depth: (Ind. Reading)
Procedure: REAM GOOD HOLE, THEN INSERT BORING BAR AND TOUCH UP AT BOTTOM OF HOLE, CHECK ANGULAR POSITION AND MOVE RADIALLY .005", THEN RETRACT STRAIGHT OUT

Results: Specimen No. 4D2B Hole #1
Surface Finish, AA 34-45 μin
Protrusion, in. .176
Perpendicularity, .001 in./gage length
Longitudinal .001/INCH Transverse .003/INCH
Flush Gage Reading, in. .003
Capacitance Gage Reading: 373
Depth of Scratch, in. .007

Bluing Pin Rollout

80%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0

Hole #2

Surface Finish, AA 25-38 μin
Protrusion, in. .175
Perpendicularity, .001 in./gage length
Longitudinal 000 Transverse .001/INCH
Flush Gage Reading, in. .002
Capacitance Gage Reading: 390
Depth of Scratch, in. .006

Bluing Pin Rollout

90%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	0	0	0	0	0	0	0	0
#5	0	+0.5	+0.5	+0.5	+0.5	0	0	0

EFFECTS OF HOLE QUALITY

Test Series 11 Quality Variable SCRATCHES - AXIAL

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.952

Modify Good Holes Using Following Conditions:
Tool: SPECIAL BORING BAR WITH 60° SHARP POINTED INSERT
Spindle, rpm 0 Feed: HAND
Cutting Fluid: DRY Depth: (Ind. Reading)
Procedure: REAM GOOD HOLE, THEN INSERT BORING BAR AND TOUCH UP AT BOTTOM OF HOLE, CHECK ANGULAR POSITION AND MOVE RADIALLY .005", THEN RETRACT STRAIGHT OUT

Results: Specimen No. 3A6T Hole #1
Surface Finish, AA 38-44 μin
Protrusion, in. .169
Perpendicularity, .001 in./gage length
Longitudinal .003/INCH Transverse .001/INCH
Flush Gage Reading, in. .003
Capacitance Gage Reading: 406
Depth of Scratch, in. .007

Bluing Pin Rollout: 90%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0

Hole #2

Surface Finish, AA 25-35 μin
Protrusion, in. .169
Perpendicularity, .001 in./gage length
Longitudinal .000 Transverse .001/INCH
Flush Gage Reading, in. .003
Capacitance Gage Reading: 384
Depth of Scratch, in. .007

Bluing Pin Rollout: 80%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	0	0	0	0	0	0	0	0
#5	0	0	0	0	0	0	0	0

EFFECTS OF HOLE QUALITY

Test Series 11 Quality Variable SCRATCHES – AXIAL

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND – 6.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.952

Modify Good Holes Using Following Conditions:
Tool: SPECIAL BORING BAR WITH 60° SHARP POINTED INSERT
Spindle, rpm 0 Feed: HAND
Cutting Fluid: DRY Depth: (Ind. Reading)
Procedure: REAM GOOD HOLE, THEN INSERT BORING BAR AND TOUCH UP AT BOTTOM OF HOLE, CHECK ANGULAR POSITION AND MOVE RADIALLY .005", THEN RETRACT STRAIGHT OUT

Results: Specimen No. 4C4T Hole #1
Surface Finish, AA 40-50 μin
Protrusion, in. .190
Perpendicularity, .001 in./gage length
Longitudinal 0 Transverse 0
Flush Gage Reading, in. .001
Capacitance Gage Reading: 288
Depth of Scratch, in. .006

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	0	+0.5	0	+0.5	0	+0.5	0	+0.5
#5	0	+1	+1	+1	0	+0.5	+0.5	0

Hole #2

Surface Finish, AA 36-45 μin
Protrusion, in. .176
Perpendicularity, .001 in./gage length
Longitudinal .003/INCH Transverse 0
Flush Gage Reading, in. .001
Capacitance Gage Reading: 372
Depth of Scratch, in. .007

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	0	0	0	0	0	0	0	0
#5	0	0	0	+0.5	0	0	0	0

INSPECTION SHEETS FOR TEST SERIES 12 - CHATTER

EFFECTS OF HOLE QUALITY

Test Series 12 Quality Variable CHATTER

Produce Good Hole Using Following Conditions:

Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 1115 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.950

Modify Good Holes Using Following Conditions:

Tool: 2-FLUTE LH SPIRAL PIN REAMER
Spindle, rpm 1115 Feed: HAND - 0.5 IPM
Cutting Fluid: DRY Depth: (Ind. Reading) -
Procedure: ADVANCE PIN REAMER INTO HOLE UNTIL IT MAKES CONTACT, THEN FEED .005" DEEPER AND DWELL

Results: Specimen No. 3B2T **Hole #1**

Surface Finish, AA 120-130 μ IN
Protrusion, in. .155
Perpendicularity, .001 in./gage length
Longitudinal 0 Transverse .007/INCH
Flush Gage Reading, in. .002
Capacitance Gage Reading: 185
Exit Burr Height, in. -

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3 5	+2	+2	+2	+2	+2	+2	+2	+2
#4 6	+0.5	0	+0.5	+1	+1	+1	0	0
#5 7	+0.5	+0.5	+0.5	+0.5	+0.5	+0.5	+0.5	+0.5

Hole #2

Surface Finish, AA 0-100 μ IN
Protrusion, in. .130
Perpendicularity, .001 in./gage length
Longitudinal .003/INCH Transverse .003/INCH
Flush Gage Reading, in. .002
Capacitance Gage Reading: 216
Exit Burr Height, in. -

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4 6	+1	+1	+0.5	+0.5	0	0	+0.5	+0.5
#5 7	0	0	0	0	0	0	0	0

EFFECTS OF HOLE QUALITY

Test Series 12 Quality Variable CHATTER

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 1115 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.950

Modify Good Holes Using Following Conditions:
Tool: 2 FLUTE LH SPIRAL PIN REAMER
Spindle, rpm 1115 Feed: HAND - 0.5 IPM
Cutting Fluid: DRY Depth: (Ind. Reading) —
Procedure: ADVANCE PIN REAMER INTO HOLE UNTIL IT MAKES CONTACT, THEN FEED .005" DEEPER AND DWELL

Results: Specimen No. 5DST , Hole #1

Surface Finish, AA 125-140 μin

Protrusion, in. .146

Perpendicularity, .001 in./gage length

Longitudinal .003/INCH Transverse .002 /INCH

Flush Gage Reading, in. .002

Capacitance Gage Reading: 188

Exit Burr Height, in. —

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#5	+2	+2	+2	+2	+2	+2	+2	+2
#6	+0.5	0	0	0	+1	+0.5	0	0
#7	+1.5	+1.5	+0.5	+0.5	+0.5	+0.5	+1	+1.5

Hole #2

Surface Finish, AA 125-145 μin

Protrusion, in. .135

Perpendicularity, .001 in./gage length

Longitudinal .005/INCH Transverse .002/INCH

Flush Gage Reading, in. .002

Capacitance Gage Reading: 196

Exit Burr Height, in. —

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#5	+2.5	+2.5	+2.5	+2.5	+2.5	+3	+3	+3
#6	+0.5	0	0	0	0	0	+0.5	+0.5
#7	0	0	+0.5	0	0	0	0	0

EFFECTS OF HOLE QUALITY

Test Series 12 Quality Variable CHATTER

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 1115 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.960

Modify Good Holes Using Following Conditions:
Tool: 2-FLUTE LH SPIRAL PIN REAMER
Spindle, rpm 1115 Feed: HAND - 0.5 IPM
Cutting Fluid: DRY Depth: (Ind. Reading) —
Procedure: ADVANCE PIN REAMER INTO HOLE UNTIL IT MAKES CONTACT, THEN FEED .005' DEEPER AND DWELL

Results: Specimen No. 6A3CT Hole #1
Surface Finish, AA 70-80 μ IN
Protrusion, in. .170
Perpendicularity, .001 in./gage length
Longitudinal .003/INCH Transverse .002/INCH
Flush Gage Reading, in. .002
Capacitance Gage Reading: 187
Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4 5	+1.5	+1.5	+1	+1	+1.5	+1.5	+2	+2
#5 6	0	0	+0.5	+0.5	0	+0.5	+0.5	+0

Hole #2
Surface Finish, AA 100-120 μ IN
Protrusion, in. .162
Perpendicularity, .001 in./gage length
Longitudinal .001/INCH Transverse .003/INCH
Flush Gage Reading, in. .002
Capacitance Gage Reading: 212
Exit Burr Height, in. -

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	+1.5	+1.5	+1	+1	+1	+1.5	+2	+2
#5	+0.5	+0.5	+0.5	+0.5	+0.5	+0.5	+0.5	+0.5

EFFECTS OF HOLE QUALITY

Test Series 12 Quality Variable CHATTER

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 1115 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.950

Modify Good Holes Using Following Conditions:
Tool: 2 FLUTE LH SPIRAL PIN REAMER
Spindle, rpm 1115 Feed: HAND - 0.5 IPM
Cutting Fluid: DRY Depth: (Ind. Reading) -
Procedure: ADVANCE PIN REAMER INTO HOLE UNTIL IT MAKES CONTACT, THEN FEED .005" DEEPER AND DWELL

Results: Specimen No. 5A1B Hole #1
Surface Finish, AA 150-160 μin
Protrusion, in. .178
Perpendicularity, .001 in./gage length
Longitudinal .002/INCH Transverse .001/INCH
Flush Gage Reading, in. .001
Capacitance Gage Reading: 200
Exit Burr Height, in. -

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#K5	+1	+0.5	+1	+1	+1	+1	+1	+1
#B6	+1	+1	+0.5	+0.5	0	+0.5	+1	+1

Hole #2
Surface Finish, AA 160-180 μin
Protrusion, in. .135
Perpendicularity, .001 in./gage length
Longitudinal .001/INCH Transverse .005/INCH
Flush Gage Reading, in. .001
Capacitance Gage Reading: 194
Exit Burr Height, in. -

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#K5	+2	+2	+1.5	+1	+1	+1	+2	+2
#B6	+0.5	+0.5	+0.5	0	0	+0.5	+0.5	+0.5

EFFECTS OF HOLE QUALITY

Test Series 12 Quality Variable CHATTER

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 1115 Feed: HAND — 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.950

Modify Good Holes Using Following Conditions:
Tool: 2 FLUTE LH SPIRAL PIN REAMER
Spindle, rpm 1115 Feed: HAND — 0.5 IPM
Cutting Fluid: DRY Depth: (Ind. Reading) —
Procedure: ADVANCE PIN REAMER INTO HOLE UNTIL IT MAKES CONTACT, THEN FEED .005" DEEPER AND DWELL

Results: Specimen No. 6A1CT Hole #1
Surface Finish, AA 160-180 μ IN
Protrusion, in. .141
Perpendicularity, .001 in./gage length
Longitudinal .012/INCH Transverse 0
Flush Gage Reading, in. .004
Capacitance Gage Reading: 200
Exit Burr Height, in. —

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4 5	+1	+1	+0.5	-1	-1.5	+1.5	+1	+0.5
#5 6	+1	+0.5	0	0	+1	+1	0	0

Hole #2

Surface Finish, AA 160-180 μ IN
Protrusion, in. .130
Perpendicularity, .001 in./gage length
Longitudinal .004/INCH Transverse .004/INCH
Flush Gage Reading, in. .003
Capacitance Gage Reading: 238
Exit Burr Height, in. —

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4 5	+0.5	0	0	0	0	0	+0.5	+0.5
#5 6	0	0	0	0	0	0	0	+0.5

EFFECTS OF HOLE QUALITY

Test Series 12 Quality Variable CHATTER

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 1115 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.950

Modify Good Holes Using Following Conditions:
Tool: 2 FLUTE LH SPIRAL PIN REAMER
Spindle, rpm 1115 Feed: HAND - 0.5 IPM
Cutting Fluid: DRY Depth: (Ind. Reading) -
Procedure: ADVANCE PIN REAMER INTO HOLE UNTIL IT MAKES CONTACT, THEN FEED .005" DEEPER AND DWELL

Results: Specimen No. 5C1CT, Hole #1

Surface Finish, AA 150 - 180 μin
Protrusion, in. .131
Perpendicularity, .001 in./gage length
Longitudinal .003/INCH Transverse .002/INCH
Flush Gage Reading, in. .002
Capacitance Gage Reading: 172
Exit Burr Height, in. -

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#6	+2	+2	+1.5	+1.5	+2	+2	0	+1
#7	+2	+2.5	+0.5	+1	+1.5	+2	+2	+1

Hole #2

Surface Finish, AA 200 - 220 μin
Protrusion, in. .161
Perpendicularity, .001 in./gage length
Longitudinal .002/INCH Transverse .001/INCH
Flush Gage Reading, in. .002
Capacitance Gage Reading: 224
Exit Burr Height, in. -

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#5	+2	+1	0	0	0	0	+0.5	+1.5
#6	+1	+1	0	+0.5	+1	+2	+0.5	+0.5

EFFECTS OF HOLE QUALITY

Test Series 12 Quality Variable CHATTER

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 1115 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.950

Modify Good Holes Using Following Conditions:
Tool: 2-FLUTE LH SPIRAL PIN REAMER
Spindle, rpm 1115 Feed: HAND - 0.5 IPM
Cutting Fluid: DRY Depth: (Ind. Reading) -
Procedure: ADVANCE PIN REAMER INTO HOLE UNTIL IT MAKES CONTACT, THEN FEED .005" DEEPER AND DWELL

Results: Specimen No. 5A3T Hole #1
Surface Finish, AA 180-210 μ IN
Protrusion, in. .158
Perpendicularity, .001 in./gage length
Longitudinal .003/INCH Transverse .005/INCH
Flush Gage Reading, in. .003
Capacitance Gage Reading: 186
Exit Burr Height, in. -

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#4	+2	+2	+2	+2.5	+3	+2.5	+2.5	+2
#5	+1	+1	+1	+1	+1	+1	+1	+1
#6	+1.5	+1.5	+1	+1	+1	+1.5	+1.5	+1.5

Hole #2
Surface Finish, AA 170-200 μ IN
Protrusion, in. .136
Perpendicularity, .001 in./gage length
Longitudinal .004/INCH Transverse 0
Flush Gage Reading, in. .002
Capacitance Gage Reading: 217
Exit Burr Height, in. -

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#5	+1.5	+1.5	+1.5	+1.5	+1.5	+1.5	+1.5	+1.5
#6	0	0	0	0	0	0	0	0

EFFECTS OF HOLE QUALITY

Test Series 12 Quality Variable CHATTER

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 1115 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.950

Modify Good Holes Using Following Conditions:
Tool: 2 FLUTE LH SPIRAL PIN REAMER
Spindle, rpm 1115 Feed: HAND - 0.5 IPM
Cutting Fluid: DRY Depth: (Ind. Reading) -
Procedure: ADVANCE PIN REAMER INTO HOLE UNTIL IT MAKES CONTACT, THEN FEED .005" DEEPER AND DWELL

Results: Specimen No. 6A1CB, Hole #1

Surface Finish, AA 200-220 μin
Protrusion, in. .152
Perpendicularity, .001 in./gage length
Longitudinal .001/INCH Transverse .004/INCH
Flush Gage Reading, in. .002
Capacitance Gage Reading: 222
Exit Burr Height, In. -

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
	Angular Position							
Bottom #1								
#2								
#3								
#~~4~~5	+1.5	+2	+2	+2	+2	+2	+2	+1.5
#~~5~~6	0	0	0	+0.5	+0.5	0	0	0

Hole #2

Surface Finish, AA 180-200 μin
Protrusion, in. .161
Perpendicularity, .001 in./gage length
Longitudinal 0 Transverse .002/INCH
Flush Gage Reading, in. .001
Capacitance Gage Reading: 186
Exit Burr Height, In. -

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
	Angular Position							
Bottom #1								
#2								
#3								
#~~4~~5	+1.5	+1.5	+1	+1	+1	+1	+1.5	+1.5
#~~5~~6	+0.5	+0.5	+0.5	+0.5	+0.5	+0.5	+0.5	+0.5

EFFECTS OF HOLE QUALITY

Test Series 12 Quality Variable CHATTER

Produce Good Hole Using Following Conditions:

Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)

Spindle, rpm 1115 Feed: HAND - 0.5 IPM

Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.950

Modify Good Holes Using Following Conditions:

Tool: 2-FLUTE LH SPIRAL PIN REAMER

Spindle, rpm 1115 Feed: HAND - 0.5 IPM

Cutting Fluid: DRY Depth: (Ind. Reading) —

Procedure: ADVANCE PIN REAMER INTO HOLE UNTIL IT MAKES CONTACT, THEN FEED .005" DEEPER AND DWELL

Results: Specimen No. 3A2B Hole #1

Surface Finish, AA 140-150 μ IN

Protrusion, in. .185

Perpendicularity, .001 in./gage length

Longitudinal .002/INCH Transverse .002/INCH

Flush Gage Reading, in. .001

Capacitance Gage Reading: 270

Exit Burr Height, in. —

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3 4	0	0	0	0	0	0	0	0
#4 5	0	0	0	0	0	0	0	0
#5 6								

Hole #2

Surface Finish, AA 140-160 μ IN

Protrusion, in. .186

Perpendicularity, .001 in./gage length

Longitudinal .002/INCH Transverse 0

Flush Gage Reading, in. .001

Capacitance Gage Reading: 259

Exit Burr Height, in. —

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	+0.5	+0.5	+0.5	+0.5	+0.5	+0.5	+0.5	+0.5
#5	0	0	0	0	0	0	0	0

EFFECTS OF HOLE QUALITY

Test Series 12 Quality Variable CHATTER

Produce Good Hole Using Following Conditions:

Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)

Spindle, rpm 1115 Feed: HAND – 0.5 IPM

Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.950

Modify Good Holes Using Following Conditions:

Tool: 2-FLUTE LH SPIRAL PIN REAMER

Spindle, rpm 1115 Feed: HAND – 0.5 IPM

Cutting Fluid: DRY Depth: (Ind. Reading) —

Procedure: ADVANCE PIN REAMER INTO HOLE UNTIL IT MAKES CONTACT, THEN FEED .005" DEEPER AND DWELL

Results: Specimen No. 5A2CB Hole #1

Surface Finish, AA 160–180 μ IN

Protrusion, in. .182

Perpendicularity, .001 in./gage length

Longitudinal, .003/INCH Transverse 0

Flush Gage Reading, in. .003

Capacitance Gage Reading: 250

Exit Burr Height, in. —

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	+0.5	+1	+1	+1	+1	+1	+1	+1
#5	0	0	0	0	0	0	0	0

Hole #2

Surface Finish, AA 190–200 μ IN

Protrusion, in. .133

Perpendicularity, .001 in./gage length

Longitudinal, .001/INCH Transverse .002/INCH

Flush Gage Reading, in. .003

Capacitance Gage Reading: 193

Exit Burr Height, in. —

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4	+2.5	+2.5	+2	+1.5	+1.5	+2.5	+2	+2
#5	+1	+1	+1	+1	+0.5	+1	+1	+1

INSPECTION SHEETS FOR TEST SERIES 12 -

TEARS, LAPS, PLASTIC DEFORMATION

MANUFACTURING REPORT: TAPERED HOLES

Test Series 12 Quality Variable TEARS, LAPS, PLASTIC DEFORMATION
Specimen No. 3B4T

Hole Manufacturing Conditions and Procedures: TAPER REAM WITH BUILT UP CUTTER

Spindle, rpm 2720 RPM Feed: .0015 IPR
Cutting Fluid: DRY Depth: (Ind. Reading) 1.710

Hole #1

Surface Finish, AA 20
Protrusion, in. .224
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse .025
Flush Gage Reading, in. .002
Capacitance Gage Reading .193
Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1							
#2							
#3	.0	1.5	1.5	.5	1.0	1.0	1.0
#4	1.0	1.5	2.5	1.0	2.5	1.5	1.0
#5	3.0	3.0	3.0	2.5	3.0	3.0	3.0

Hole #2

Surface Finish, AA 100-105
Protrusion, in. .218
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .0015
Flush Gage Reading, in. .001
Capacitance Gage Reading .191
Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1							
#2							
#3	3.0	3.0	3.0	3.0	3.0	3.0	3.0
#4	1.0	.5	.5	1.5	1.0	.5	1.5
#5	1.5	1.5	1.0	1.5	1.5	.5	1.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 12 Quality Variable TEARS, LAPS, PLASTIC DEFORMATION
Specimen No. SB2C8

Hole Manufacturing Conditions and Procedures: TAPER REAM WITH BUILT UP CUTTER

Spindle, rpm 2720 RPM Feed: .0015 IPR
Cutting Fluid: DRY Depth: (Ind. Reading) 1.710

Hole #1

Surface Finish, AA 111-120
Protrusion, in. .225
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .002
Flush Gage Reading, in. -.020
Capacitance Gage Reading .168
Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1							
#2							
#3	1.5	1.0	1.5	1.5	1.5	1.0	.5
#4	1.5	1.5	3.0	1.5	1.5	1.5	1.0
#5	3.0	3.0	3.0	3.0	3.0	3.0	3.0

Hole #2

Surface Finish, AA 70-80
Protrusion, in. .221
Perpendicularity, .001 in./in.
Longitudinal .002 Transverse .0005
Flush Gage Reading, in. .002
Capacitance Gage Reading .192
Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1							
#2							
#3	.5	.0	.0	.0	.0	1.0	1.0
#4	1.0	.0	2.5	1.0	.0	1.0	1.5
#5	3.0	3.0	3.0	2.5	3.0	3.0	3.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 12 Quality Variable TEARS, LAPS, PLASTIC DEFORMATION
Specimen No. 4B3BC

Hole Manufacturing Conditions and Procedures: TAPER REAM WITH BUILT UP CUTTER

Spindle, rpm 2720 RPM Feed: .0015 IPR
Cutting Fluid: DRY Depth: (Ind. Reading) 1.710

Hole #1

Surface Finish, AA 83-87
Protrusion, in. .222
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse .001
Flush Gage Reading, in. .003
Capacitance Gage Reading .191
Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1							
#2							
#3	.5	.5	.5	.5	.0	.5	1.5
#4	1.0	.5	.0	1.0	.5	.5	1.0
#5	1.5	1.0	1.0	1.0	1.5	1.0	1.5

Hole #2

Surface Finish, AA 108-110
Protrusion, in. .200
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse 0
Flush Gage Reading, in. .003
Capacitance Gage Reading .199
Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1							
#2							
#3	1.0	1.0	1.0	1.5	.5	1.0	1.0
#4	.5	.5	.5	1.0	1.0	.5	.5
#5	1.5	1.0	1.5	1.5	1.0	1.5	1.5

MANUFACTURING REPORT: TAPERED HOLES

Test Series 12 Quality Variable TEARS, LAPS, PLASTIC DEFORMATION
Specimen No. 4BLB

Hole Manufacturing Conditions and Procedures: TAPER REAM WITH BUILT UP CUTTER

Spindle, rpm 2720 RPM Feed: .0015 IPR
Cutting Fluid: DRY Depth: (Ind. Reading) 1.710

Hole #1

Surface Finish, AA 55-58 Bluing Pin Rollout
Protrusion, in. .226
Perpendicularity, .001 in./in.
Longitudinal .0005 Transverse .001
Flush Gage Reading, in. .001
Capacitance Gage Reading .186
Exit Burr Height, in.

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	180°	225°	270°	315°
Bottom #1							
#2							
#3	.0	.0	.5	1.0	+1.0	.0	.0
#4	1.0	.0	.0	1.0	.0	.0	1.0
#5	3.0	3.0	3.0	3.0	2.5	2.5	2.5

Hole #2

Surface Finish, AA 70-75 Bluing Pin Rollout
Protrusion, in. .213
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse .001
Flush Gage Reading, in. .002
Capacitance Gage Reading .206
Exit Burr Height, in.

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	180°	225°	270°	315°
Bottom #1							
#2							
#3	.0	.0	.0	.0	.0	.0	.0
#4	1.0	.0	1.0	.0	.0	.0	.5
#5	1.0	1.0	1.0	1.0	.5	.0	.5

MANUFACTURING REPORT: TAPERED HOLES

Test Series 12 Quality Variable TEARS, LAPS, PLASTIC DEFORMATION
Specimen No. 3B1B

Hole Manufacturing Conditions and Procedures: TAPER REAM WITH BUILT UP CUTTER

Spindle, rpm 2720 RPM Feed: .0015 IPR
Cutting Fluid: DRY Depth: (Ind. Reading) 1.710

Hole #1

Surface Finish, AA 50
Protrusion, in. .227
Perpendicularity, .001 in./in.
Longitudinal .0015 Transverse 0
Flush Gage Reading, in. .0
Capacitance Gage Reading .219
Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1							
#2							
#3	1.0	1.0	.5	1.0	1.0	.5	.5
#4	.5	1.0	.5	.5	1.0	.0	.5
#5	2.0	1.5	1.0	1.0	1.5	1.0	1.0

Hole #2

Surface Finish, AA 100 - 105
Protrusion, in. .115
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .002
Flush Gage Reading, in. .0
Capacitance Gage Reading .204
Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1							
#2							
#3	3.0	3.0	3.0	3.0	3.0	2.5	3.0
#4	1.0	1.0	1.0	.5	1.0	.5	1.0
#5	1.0	1.0	.5	.0	.5	.0	.5

MANUFACTURING REPORT: TAPERED HOLES

Test Series 12 Quality Variable TEARS, LAPS, PLASTIC DEFORMATION
Specimen No. 5E4KT

Hole Manufacturing Conditions and Procedures: TAPER REAM WITH BUILT UP CUTTER

Spindle, rpm 2720 RPM Feed: .0015 IPR
Cutting Fluid: DRY Depth: (Ind. Reading) 1.710

Hole #1

Surface Finish, AA 83-87

Protrusion, in. .215

Perpendicularity, .001 in./in.

Longitudinal .001 Transverse .0005

Flush Gage Reading, in. -.002

Capacitance Gage Reading .184

Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1							
#2							
#3	2.5	2.5	2.0	2.0	2.0	2.5	2.5
#4	1.0	1.0	.5	.5	1.0	.5	1.0
#5	1.0	1.0	.5	1.0	1.0	.5	1.0

Hole #2

Surface Finish, AA 90-95

Protrusion, in. .220

Perpendicularity, .001 in./in.

Longitudinal .002 Transverse .0005

Flush Gage Reading, in. .001

Capacitance Gage Reading .179

Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1							
#2							
#3	.5	1.0	1.0	1.5	.5	1.5	1.5
#4	1.0	1.5	.5	1.5	.5	1.5	1.5
#5	2.0	2.0	1.5	2.0	1.5	1.5	2.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 12   Quality Variable TEARS, LAPS, PLASTIC DEFORMATION
Specimen No. 4E6T

Hole Manufacturing Conditions and Procedures: TAPER REAM WITH BUILT UP CUTTER

Spindle, rpm 2720 RPM   Feed: .0015 IPR
Cutting Fluid: DRY   Depth: (Ind. Reading) 1.710

Hole #1

Surface Finish, AA 28-32   Bluing Pin Rollout
Protrusion, in. .227
Perpendicularity, .001 in./in.
Longitudinal .0005 Transverse .003
Flush Gage Reading, in. 0
Capacitance Gage Reading .227
Exit Burr Height, in.

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1							
#2							
#3	9.0	9.0	7.0	7.0	5.5	8.0	3.0
#4	7.0	6.5	6.0	4.5	3.5	5.0	1.0
#5	12.5	12.0	11.0	7.0	8.0	10.0	9.0

Hole #2

Surface Finish, AA 100-103   Bluing Pin Rollout
Protrusion, in. .210
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .002
Flush Gage Reading, in. .002
Capacitance Gage Reading .193
Exit Burr Height, in.

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1							
#2							
#3	5.0	5.0	3.0	8.0	8.0	4.0	6.0
#4	8.0	7.0	5.5	6.0	6.5	2.0	3.5
#5	11.0	11.0	9.5	7.0	7.5	3.5	4.5

MANUFACTURING REPORT: TAPERED HOLES

Test Series 12 Quality Variable TEARS, LAPS, PLASTIC DEFORMATION
Specimen No. 3R1B

Hole Manufacturing Conditions and Procedures: TAPER REAM WITH BUILT UP CUTTER

Spindle, rpm 2720 RPM Feed: .0015 IPR
Cutting Fluid: DRY Depth: (Ind. Reading) 1.710

Hole #1

Surface Finish, AA 105-108
Protrusion, in. .144
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .002
Flush Gage Reading, in. .001
Capacitance Gage Reading .213
Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1							
#2							
#3	12.0	12.0	12.0	11.0	12.0	12.0	11.0
#4	3.0	5.0	2.0	2.0	5.0	2.5	3.5
#5	.0	1.5	.0	.0	1.0	.0	1.0

Hole #2

Surface Finish, AA 103-105
Protrusion, in. .223
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse .002
Flush Gage Reading, in. .001
Capacitance Gage Reading .193
Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1							
#2							
#3	5.0	6.0	12.0	7.0	7.0	5.0	3.5
#4	7.0	7.0	10.0	4.0	3.5	3.0	.0
#5	9.0	10.0	10.0	1.0	.5	1.0	-2.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 12 Quality Variable TEARS, LAPS, PLASTIC DEFORMATION
Specimen No. SEL CT

Hole Manufacturing Conditions and Procedures: TAPER REAM WITH BUILT UP CUTTER

Spindle, rpm 2720 RPM Feed: .0015 IPR
Cutting Fluid: DRY Depth: (Ind. Reading) 1.710

Hole #1

Surface Finish, AA 38-42
Protrusion, in. .190
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .0025
Flush Gage Reading, in. 0
Capacitance Gage Reading .267
Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1							
#2							
#3	1.0	1.5	2.0	2.0	2.0	2.0	2.5
#4	.5	.5	.5	.5	1.0	.5	1.0
#5	1.0	.5	.0	.5	.5	.0	.5

Hole #2

Surface Finish, AA 100-105
Protrusion, in. .231
Perpendicularity, .001 in./in.
Longitudinal .002 Transverse .0005
Flush Gage Reading, in. .0
Capacitance Gage Reading .182
Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1							
#2							
#3	1.0	1.0	1.5	1.5	1.0	2.0	2.0
#4	1.0	.5	.5	1.5	1.0	.5	1.0
#5	1.5	1.0	1.0	2.0	2.0	1.0	1.5

MANUFACTURING REPORT: TAPERED HOLES

Test Series 12 Quality Variable TEARS, LAPS, PLASTIC DEFORMATION
Specimen No. 3A3T

Hole Manufacturing Conditions and Procedures: TAPER REAM WITH BUILT UP CUTTER

Spindle, rpm 2720 RPM Feed: .0015 IPR
Cutting Fluid: DRY Depth: (Ind. Reading) 1.710

Hole #1

Surface Finish, AA 140-145
Protrusion, in. .221
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse .004
Flush Gage Reading, in. .001
Capacitance Gage Reading .223
Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1							
#2							
#3	1.5	1.0	1.0	1.0	1.0	1.0	1.5
#4	1.0	.5	.5	.5	.5	1.0	1.0
#5	1.5	1.0	.5	1.0	.5	.5	1.0

Hole #2

Surface Finish, AA 125-130
Protrusion, in. .225
Perpendicularity, .001 in./in.
Longitudinal .0 Transverse .001
Flush Gage Reading, in. 0
Capacitance Gage Reading .192
Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1							
#2							
#3	1.5	1.5	2.0	2.0	2.5	2.5	2.5
#4	1.0	1.0	.5	1.5	.0	.0	1.0
#5	1.5	1.5	1.0	2.0	1.0	1.5	1.5

INSPECTION SHEETS FOR TEST SERIES 17 - OVALITY

MANUFACTURING REPORT: TAPERED HOLES

Test Series 17 Quality Variable OVALITY
Specimen No. 3R3B

Hole Manufacturing Conditions and Procedures: TAPER REAM WITH STd. REAMER FOR MIN. INTERFERENCE. BACK OUT STRAIGHT FLUTED SIDE CUTTING TAPER REAMER. MOVE ±.007 AND PLUNGE CUT TO PRODUCE OVALITY

Spindle, rpm 660 Feed: .0015
Cutting Fluid: DRY Depth: (Ind. Reading) 1.130

Hole #1

Surface Finish, AA 125
Protrusion, in. 127
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse .002
Flush Gage Reading, in. -.002
Capacitance Gage Reading 263
Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)
Angular Position

318/323

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	6.0	-7.0	-7.0	-6.0	-10.0	-7.0	-7.0
#2	3.0	4.0	4.0	3.0	3.0	6.0	4.0
#3	2.0	8.0	10.0	3.0	7.0	11.0	8.0
#4	1.0	12.0	13.0	0	10.0	12.0	12.0
#5	6.0	12.0	13.0	0	10.0	13.0	[illegible]

Hole #2

Surface Finish, AA 95-100
Protrusion, in. 129
Perpendicularity, .001 in./in.
Longitudinal .0005 Transverse .002
Flush Gage Reading, in. -.002
Capacitance Gage Reading 296
Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)
Angular Position

319/323

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-6.0	-9.0	-6.0	-6.0	-9.0	-6.0	-10.0
#2	5.0	1.0	5.0	5.0	2.0	5.0	2.0
#3	5.0	6.0	11.0	5.0	5.0	11.0	6.0
#4	5.0	11.0	13.0	5.0	11.0	13.0	11.0
#5	6.0	15.0	13.0	6.0	10.0	10.0	10.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 17 Quality Variable OVALITY
Specimen No. 3D1B

Hole Manufacturing Conditions and Procedures: TAPER REAM WITH Std. REAMER FOR MIN. INTERFERENCE. BACK OUT STRAIGHT FLUTED SIDE CUTTING TAPER REAMER. MOVE ±.007 AND PLUNGE CUT TO PRODUCE OVALITY

Spindle, rpm 660 Feed: .0015
Cutting Fluid: DRY Depth: (Ind. Reading) 1.130

Hole #1

Surface Finish, AA 120-125
Protrusion, in. .123
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse .002
Flush Gage Reading, in. 0
Capacitance Gage Reading 305
Exit Burr Height, in.

Bluing Pin Rollout

55%

318/323

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-2.0	-2.0	2.0	-4.0	-10	0	-4.0
#2	3.0	3.0	7.0	6.0	6.0	9.0	5.0
#3	6.0	5.0	—	8.0	14.0	—	[illegible]
#4	7.0	12.0	—	9.0	—	—	12.0
#5	8.0	—	—	11.0	—	—	13.0

Hole #2

Surface Finish, AA 85-90
Protrusion, in. .122
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse 0
Flush Gage Reading, in. -.001
Capacitance Gage Reading 312
Exit Burr Height, in.

Bluing Pin Rollout

60%

319/323

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-6.0	-3.0	-6.0	-6.0	-7.0	-8.0	-8.0
#2	5.0	6.0	5.0	3.0	3.0	4.0	2.0
#3	2.0	8.0	14.0	4.0	10.0	12.0	6.0
#4	7.0	10.0	—	5.0	12.0	13.0	16.0
#5	7.0	13.0	—	4.0	11.0	13.0	10.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 17 Quality Variable OVALITY
Specimen No. 4D5BC

Hole Manufacturing Conditions and Procedures: TAPER REAM WITH Std. REAMER FOR MIN. INTERFERENCE. BACK OUT STRAIGHT FLUTED SIDE CUTTING TAPER REAMER. MOVE ±.007 AND PLUNGE CUT TO PRODUCE OVALITY

Spindle, rpm 660 Feed: .0015
Cutting Fluid: DRY Depth: (Ind. Reading) 1.130

Hole #1

Surface Finish, AA 90-95
Protrusion, in. 132
Perpendicularity, .001 in./in.
Longitudinal .0005 Transverse .001
Flush Gage Reading, in. 0
Capacitance Gage Reading 262
Exit Burr Height, in.

Bluing Pin Rollout

65%

317/323

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-6.0	-8.0	-3.0	-6.0	-[illegible]	-4.0	-5.0
#2	4.0	0	8.0	5.0	[illegible]	6.0	10.0
#3	11.0	9.0	13.0	5.0	3.0	11.0	14.0
#4	14.0	13.0	15.0	4.0	5.0	13.0	14.0
#5	14.0	14.0	15.0	6.0	7.0	13.0	13.0

Hole #2

Surface Finish, AA 100-110
Protrusion, in. 125
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .002
Flush Gage Reading, in. -.001
Capacitance Gage Reading 276
Exit Burr Height, in.

Bluing Pin Rollout

55%

317/321

Air Gage Readings (.0001 in.)
Angular Position.

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-8.0	-4.0	-1.0	-8.0	-4.0	-4.0	-6.0
#2	3.0	2.0	5.0	3.0	4.0	5.0	3.0
#3	4.0	3.0	9.0	4.0	7.0	12.0	6.0
#4	3.0	3.0	14.0	4.0	13.0	14.0	7.0
#5	4.0	1.0	14.0	8.0	17.0	14.0	13.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 17 Quality Variable OVALITY
Specimen No. 2A3B

Hole Manufacturing Conditions and Procedures: TAPER REAM WITH Std REAMER FOR MIN. INTERFERENCE. BACK OUT STRAIGHT FLUTED SIDE CUTTING TAPER REAMER. MOVE ±.007 AND PLUNGE CUT TO PRODUCE OVALITY

Spindle, rpm 660 Feed: .0015
Cutting Fluid: DRY Depth: (Ind. Reading) 1.130

Hole #1

Surface Finish, AA 95-100
Protrusion, in. 129
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .002
Flush Gage Reading, in. -.002
Capacitance Gage Reading 285
Exit Burr Height, in.

Bluing Pin Rollout

60%

319/322

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-7.0	-8.0	-1.0	-6.0	-10.0	-7.0	-6.0
#2	2.0	-1.0	6.0	5.0	1.0	5.0	2.0
#3	3.0	7.0	12.0	6.0	6.0	12.0	6.0
#4	5.0	11.0	14.0	5.0	11.0	12.0	11.0
#5	8.0	12.0	14.0	5.0	12.0	12.0	12.0

Hole #2

Surface Finish, AA 100-110
Protrusion, in. 131
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse .003
Flush Gage Reading, in. -.001
Capacitance Gage Reading 235
Exit Burr Height, in.

Bluing Pin Rollout

60%

318/323

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-5.0	-3.0	-11.0	-4.0	-6.0	-6.0	-6.0
#2	5.0	7.0	9.0	3.0	8.0	9.0	5.0
#3	7.0	11.0	13.0	3.0	12.0	12.0	10.0
#4	8.0	14.0	15.0	2.0	12.0	13.0	11.0
#5	11.0	12.0	13.0	7.0	12.0	12.0	12.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 17 Quality Variable OVALITY

Specimen No. 5D6B

Hole Manufacturing Conditions and Procedures: TAPER REAM WITH STD. REAMER FOR MIN. INTERFERENCE. BACK OUT STRAIGHT FLUTED SIDE CUTTING TAPER REAMER. MOVE ±.007 AND PLUNGE CUT TO PRODUCE OVALITY

Spindle, rpm 660 Feed: .0015

Cutting Fluid: DRY Depth: (Ind. Reading) 1.130

Hole #1

Surface Finish, AA 95-100

Protrusion, in. 128

Perpendicularity, .001 in./in.

Longitudinal .0081 Transverse .0002

Flush Gage Reading, in. -.001

Capacitance Gage Reading 246

Exit Burr Height, in.

Bluing Pin Rollout

60

320/324

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-9.0	-5.0	-4.0	9.0	-5.0	-2.0	-6.0
#2	1.0	5.0	9.0	1.0	7.0	8.0	6.0
#3	6.0	13.0	13.0	9.0	13.0	13.0	13.0
#4	10.0	14.0	15.0	8.0	14.0	15.0	13.0
#5	13.0	14.0	15.0	7.0	13.0	13.0	14.0

Hole #2

Surface Finish, AA 90-95

Protrusion, in. 129

Perpendicularity, .001 in./in.

Longitudinal 0 Transverse .0035

Flush Gage Reading, in. -.001

Capacitance Gage Reading 264

Exit Burr Height, in.

Bluing Pin Rollout

55

319/323

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-7.0	-9.0	-3.0	5.0	-9.0	-5.0	-4.0
#2	6.0	0	3.0	6.0	0	5.0	6.0
#3	6.0	4.0	11.0	5.0	10.0	12.0	5.0
#4	6.0	11.0	14.0	5.0	14.0	14.0	8.0
#5	6.0	13.0	14.0	7.0	14.0	14.0	11.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 17 Quality Variable OVALITY
Specimen No. 4E4TC

Hole Manufacturing Conditions and Procedures: TAPER REAM WITH Std REAMER FOR MIN. INTERFERENCE. BACK OUT STRAIGHT FLUTED SIDE CUTTING TAPER REAMER. MOVE ±.007 AND PLUNGE CUT TO PRODUCE OVALITY

Spindle, rpm 660 Feed: .0015
Cutting Fluid: DRY Depth: (Ind. Reading) 1.130

Hole #1

Surface Finish, AA 85-90
Protrusion, in. 130
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .0015
Flush Gage Reading, in. -.002
Capacitance Gage Reading 266
Exit Burr Height, in.

6%

Bluing Pin Rollout

329/324

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-7.0	-4.0	-9.0	-7.0	-6.0	-10.0	-4.0
#2	1.0	5.0	6.0	2.0	6.0	8.0	6.0
#3	0	10.0	11.0	3.0	11.0	12.0	11.0
#4	4.0	13.0	13.0	4.0	12.0	14.0	14.0
#5	9.0	12.0	12.0	5.0	11.0	13.0	13.0

Hole #2

Surface Finish, AA 95-100
Protrusion, in. 135
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .0005
Flush Gage Reading, in. -.001
Capacitance Gage Reading 310
Exit Burr Height, in.

6%

Bluing Pin Rollout

318/323

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-8.0	-7.0	-9.0	-9.0	-8.0	-8.0	-9.0
#2	0	3.0	1.0	0	3.0	5.0	0
#3	0	6.0	10.0	2.0	10.0	11.0	4.0
#4	0	10.0	13.0	0	12.0	12.0	7.0
#5	1.0	11.0	12.0	3.0	12.0	11.0	10.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 17 Quality Variable OVALITY
Specimen No. 4B2TC

Hole Manufacturing Conditions and Procedures: TAPER REAM WITH STd. REAMER FOR MIN. INTERFERENCE. BACK OUT STRAIGHT FLUTED SIDE CUTTING TAPER REAMER. MOVE ±.007 AND PLUNGE CUT TO PRODUCE OV

Spindle, rpm 660 Feed: .0015
Cutting Fluid: DRY Depth: (Ind. Reading) 1.130

Hole #1

Surface Finish, AA 85-90
Protrusion, in. 123
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse .001
Flush Gage Reading, in. -.001
Capacitance Gage Reading 269
Exit Burr Height, in.

Bluing Pin Rollout

70%

3/18/72

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-6.0	-7.0	-9.0	-5.0	-10.0	-10.0	-9.0
#2	0	3.0	1.0	[illegible]	3.0	2.0	7.0
#3	9.0	8.0	11.0	2.0	6.0	11.0	12.0
#4	13.0	12.0	13.0	0	10.0	[illegible]	13.0
#5	13.0	13.0	—	-1.0	11.0	13.0	[illegible]

Hole #2

Surface Finish, AA 100-110
Protrusion, in. 132
Perpendicularity, .001 in./in.
Longitudinal .0015 Transverse .002
Flush Gage Reading, in. -.002
Capacitance Gage Reading 282
Exit Burr Height, in.

Bluing Pin Rollout

60%

3/18/72

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-9.0	-6.0	-4.0	-8.0	-7.0	-10.0	-6.0
#2	2.0	2.0	5.0	3.0	3.0	7.0	5.0
#3	3.0	4.0	10.0	4.0	6.0	13.0	7.0
#4	5.0	9.0	14.0	4.0	12.0	15.0	11.0
#5	5.0	11.0	15.0	6.0	13.0	15.0	13.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 17 Quality Variable OVALITY
Specimen No. 4A41BC

Hole Manufacturing Conditions and Procedures: TAPER REAM WITH [redacted] STd REAMER FOR MIN. INTERFERENCE. BACK OUT STRAIGHT FLUTED SIDE CUTTING TAPER REAMER. MOVE ±.007 AND PLUNGE CUT TO PRODUCE OVALITY

Spindle, rpm 660 Feed: .0015
Cutting Fluid: DRY Depth: (Ind. Reading) 1.130

Hole #1

Surface Finish, AA 120.125
Protrusion, in. 128
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .003
Flush Gage Reading, in. ±.001
Capacitance Gage Reading 330
Exit Burr Height, in.

Bluing Pin Rollout

60%

318/323

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-9.0	-8.0	-6.0	-10.0	-10.0	-9.0	-9.0
#2	0	1.0	3.0	1.0	2.0	3.0	4.0
#3	0	4.0	11.0	2.0	9.0	12.0	12.0
#4	6.0	11.0	14.0	3.0	13.0	14.0	14.0
#5	11.0	12.0	14.0	2.0	14.0	15.0	14.0

Hole #2

Surface Finish, AA 125.130
Protrusion, in. 134
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .0005
Flush Gage Reading, in. -.002
Capacitance Gage Reading 288
Exit Burr Height, in.

Bluing Pin Rollout

60%

318/322

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-6.0	-6.0	-6.0	-5.0	-5.0	-8.0	-8.0
#2	4.0	4.0	4.0	5.0	5.0	5.0	3.0
#3	4.0	3.0	11.0	5.0	11.0	13.0	8.0
#4	3.0	10.0	15.0	4.0	13.0	15.0	13.0
#5	4.0	12.0	15.0	9.0	13.0	14.0	12.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 17 Quality Variable OVALITY
Specimen No. 403B

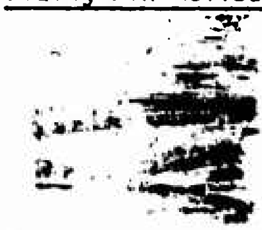
Hole Manufacturing Conditions and Procedures: TAPER REAM WITH Std ~~[illegible]~~ REAMER FOR MIN. INTERFERENCE. BACK OUT STRAIGHT FLUTED SIDE CUTTING TAPER REAMER. MOVE ±.007 AND PLUNGE CUT TO PRODUCE OVALITY

Spindle, rpm 660 Feed: .0015
Cutting Fluid: DRY Depth: (Ind. Reading) 1.130

Hole #1

Surface Finish, AA 95-100
Protrusion, in. 126
Perpendicularity, .001 in./in.
Longitudinal .0015 Transverse .002
Flush Gage Reading, in. -.001
Capacitance Gage Reading 357
Exit Burr Height, in. ______

Bluing Pin Rollout



60%

319/324

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-4.0	-7.0	-11.0	-3.0	-10.0	-7.0	-7.0
#2	5.0	6.0	7.0	5.0	3.0	7.0	4.0
#3	2.0	11.0	12.0	4.0	10.0	11.0	11.0
#4	8.0	13.0	13.0	5.0	12.0	13.0	12.0
#5	11.0	12.0	12.0	6.0	11.0	11.0	12.0

Hole #2

Surface Finish, AA 120-125
Protrusion, in. 132
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse .0015
Flush Gage Reading, in. .001
Capacitance Gage Reading 252
Exit Burr Height, in. ______

Bluing Pin Rollout

55%

310/324

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-8.0	-9.0	-6.0	-6.0	-10.0	-7.0	-9.0
#2	2.0	0	4.0	2.0	2.0	7.0	2.0
#3	3.0	8.0	11.0	1.0	10.0	12.0	9.0
#4	5.0	12.0	13.0	5.0	11.0	12.0	12.0
#5	9.0	12.0	12.0	8.0	10.0	11.0	12.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 17 Quality Variable OVALITY
Specimen No. 2#1B

Hole Manufacturing Conditions and Procedures: TAPER REAM WITH ~~[illegible]~~ STd ~~Z~~ REAMER FOR MIN. INTERFERENCE. BACK OUT STRAIGHT FLUTED SIDE CUTTING TAPER REAMER. MOVE ±.007 AND PLUNGE CUT TO PRODUCE OVALITY

Spindle, rpm 660 Feed: .0015
Cutting Fluid: DRY Depth: (Ind. Reading) 1.130

Hole #1

Surface Finish, AA 125-135
Protrusion, in. .133
Perpendicularity, .001 in./in.
Longitudinal .0015 Transverse .0015
Flush Gage Reading, in. 0
Capacitance Gage Reading 288
Exit Burr Height, in.

55

Bluing Pin Rollout

319/323

Air Gage Readings (.0001 in.)

Angular Position

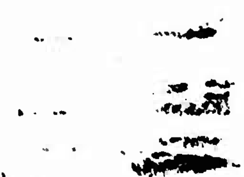
Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-8.0	-2.0	-2.0	9.0	-5.0	-5.0	-8.0
#2	-1.0	3.0	3.0	0	4.0	7.0	5.0
#3	-1.0	8.0	10.0	0	6.0	13.0	9.0
#4	0	12.0	13.0	2.0	12.0	13.0	13.0
#5	9.0	14.0	14.0	4.0	12.0	15.0	14.0

Hole #2

Surface Finish, AA 85-90
Protrusion, in. .126
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .002
Flush Gage Reading, in. -.004
Capacitance Gage Reading 276
Exit Burr Height, in.

60

Bluing Pin Rollout



319/324

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-8.0	-8.0	-3.0	-7.0	-6.0	-3.0	-5.0
#2	1.0	-1.0	3.0	0	1.0	6.0	3.0
#3	4.0	3.0	11.0	3.0	11.0	13.0	5.0
#4	3.0	10.0	14.0	7.0	14.0	15.0	10.0
#5	4.0	13.0	14.0	10.0	15.0	14.0	12.0

INSPECTION SHEETS FOR TEST SERIES 18 - EXIT BURRS

EFFECTS OF HOLE QUALITY

Test Series 18 Quality Variable W/EXIT BURR - MIN INTERFERENCE

Produce Good Hole Using Following Conditions:

Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)

Spindle, rpm 325 Feed: HAND - 0.5 IPM

Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.953

Modify Good Holes Using Following Conditions:

Tool: GROUP 2 OMARK DRILL REAMER

Spindle, rpm 325 Feed: HAND - 0.5 IPM

Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.400

Procedure: REAM GOOD HOLE, TOUCH W/ OVERSIZE REAMER WHILE NOT ROTATING, THEN REAM .080" DEEPER

Results: Specimen No. 5E3T Hole #1

Surface Finish, AA 45 μin

Protrusion, in. .118

Perpendicularity, .001 in./gage length

Longitudinal .003/INCH Transverse .003/INCH

Flush Gage Reading, in. .002

Capacitance Gage Reading: 411

Exit Burr Height, in. .014

Bluing Pin Rollout

90%

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
	Angular Position							
Bottom #1	+1	+1	+2.5	+0.5	0	0	+[illegible]	+1
#2	+1	+1	+2.5	+2.5	+0.5	+[illegible]	+1	+1
#3	+1	+0.5	+2.5	1	+0.5	+1	+1	+1
#4	+2.5	+2.5	+2.5	+1	+0.5	0	2	[illegible]
#5	+1.5	+1.5	+1.0	+1	+2.5	0	2	+[illegible]

Hole #2

Surface Finish, AA 40 μin

Protrusion, in. .115

Perpendicularity, .001 in./gage length

Longitudinal .000 Transverse .005/INCH

Flush Gage Reading, in. .002

Capacitance Gage Reading: 411

Exit Burr Height, in. .004

Bluing Pin Rollout

90%

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
	Angular Position							
Bottom #1	+1	+1	+1	0	0	0	+0.5	+1
#2	+1	+1	+1	0	0	0	+0.5	+1
#3	+1	+1	+1	+0.5	0	0	+2.5	+1
#4	+0.5	+0.5	+0.5	0	+0.5	+0.5	+0.5	+0.5
#5	+1	+1	+0.5	0	0	+0.5	+1	+1

EFFECTS OF HOLE QUALITY

Test Series 1B Quality Variable W/EXIT BURR-MIN INTERFERENCE

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND-0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.953

Modify Good Holes Using Following Conditions:
Tool: GROUP 2 OMARK DRILL-REAMER
Spindle, rpm 325 Feed: HAND 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.400
Procedure: REAM GOOD HOLE, TOUCH UP OVERSIZE REAMER WHILE NOT ROTATING THEN REAM .080" DEEPER

Results: Specimen No. 5D6T Hole #1
Surface Finish, AA
Protrusion, in. .110
Perpendicularity, .001 in./gage length
Longitudinal 000 Transverse .002/INCH
Flush Gage Reading, in. 004
Capacitance Gage Reading: 415
Exit Burr Height, in. .020

Bluing Pin Rollout
70%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	0	0	+0.5	0	+0.5	+0.5	+1	+1
#2	0	0	0	+0.5	+1	+1.5	+1.5	+1
#3	0	-2.5	0	+0.5	+1	+2	+2	+1
#4	+1	+1	0	0	0	0	0	+0.5
#5	+1.5	+1	+0.5	0	0	0	+1	+1.5

Hole #2

Surface Finish, AA
Protrusion, in. .115
Perpendicularity, .001 in./gage length
Longitudinal 000 Transverse .006/INCH
Flush Gage Reading, in. .000
Capacitance Gage Reading: 452
Exit Burr Height, in. .008

Bluing Pin Rollout
70%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	0	+0.5	+0.5	+0.5	0	0	0	0
#2	0	+0.5	+1	+0.5	0	0	0	0
#3	0	+0.5	+1	+1	+0.5	0	0	0
#4	0	0	0	0	0	+0.5	0	0
#5	+1	+1	0	0	0	+0.5	+0.5	+1

EFFECTS OF HOLE QUALITY

Test Series 18 Quality Variable W/ Exit Burr - [illegible]

Produce Good Hole Using Following Conditions:

Tools: #2 Centerdrill; 19/64 in. pilot drill; Group I, Omark Drill Reamer (TLD2040AR1-5)

Spindle, rpm 325 Feed: Hand - 0.5 IPM

Cutting Fluid: [illegible] Depth: (Ind. Reading) 1.953

[illegible] 0.200

Modify Good Holes Using Following Conditions:

Tool: [illegible]

Spindle, rpm 325 Feed: [illegible]

Cutting Fluid: [illegible] Depth: (Ind. Reading) 1.330

Procedure: [illegible] hole - then [illegible] into hole without [illegible] and [illegible] ream to .060 [illegible] reading at [illegible]

Results: Specimen No. 5B4T

Hole #1 [illegible]

Surface Finish, AA 20-45 μ in.

Protrusion, in. .110

Perpendicularity, .001 in./gage length

Longitudinal [illegible] Transverse [illegible]

Flush Gage Reading, in. .004

Capacitance Gage Reading: 49 [illegible]

Exit Burr Height, in. .015

Bluing Pin Rollout

50%

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
	Angular Position							
Bottom #1	0	0	0	0	0	0	0	0
#2	0	[illegible]	0	[illegible]	0	+1	+1	+1
#3	0	-2	-1	2	[illegible]	+1.5	+2	+1.5
#4	+0.5	0	0	+.5	0	0	-0.5	0
#5	+1.5	[illegible]	+1	+0.5	0	0	0	+0.5

Hole #2

Surface Finish, AA 20-40 μ in.

Protrusion, in. .119

Perpendicularity, .001 in./gage length

Longitudinal .003/inch Transverse .000

Flush Gage Reading, in. .00[illegible]

Capacitance Gage Reading: 44 [illegible]

Exit Burr Height, in. 0

Bluing Pin Rollout

[illegible]

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
	Angular Position							
Bottom #1	0	0	0	0	-0.5	-0.5	0	0
#2	0	+0.5	+1	+1	0	[illegible]	0	0
#3	0	+1	+1.5	+1.5	+0.5	0	0	0
#4	0	0	0	+0.5	+0.5	+0.5	0	0
#5	+1	+1	+1	0	0	0	0	+1

EFFECTS OF HOLE QUALITY

Test Series 18 Quality Variable W/ Ex.- [illegible] Interference

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: [illegible]
Cutting Fluid: Standard Solvent Depth: (Ind. Reading) 1.952

0 @ [illegible]

Modify Good Holes Using Following Conditions:
Tool: Group 2 Omark Risk Reamer
Spindle, rpm 325 Feed: Hand - 0.5 IPM
Cutting Fluid: Standard Solvent Depth: (Ind. Reading) 1.392
Procedure: Ream good hole, [illegible] up with oversize reamer and feed .062' deeper

Results: Specimen No. 5C2T Hole #1 ([illegible] End)

Surface Finish, AA 25 - 35 [illegible]
Protrusion, in. .115
Perpendicularity, .001 in./gage length
Longitudinal 000 Transverse .00? [illegible]
Flush Gage Reading, in. .002
Capacitance Gage Reading: 390
Exit Burr Height, in. .010

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	0	+1	+0.5	0	0	0	0.5	0
#2	0	+2.5	0	0	0	+0.5	1	+0.5
#3	0	2	0	0	+[illegible]	+1	1.5	+0.5
#4	0	+2.5	0	+0.5	+1.5	0	0	0
#5	+1	+1	+1	+0.5	+0.5	0	0	0

Hole #2

Surface Finish, AA 20 - [illegible]
Protrusion, in. .120
Perpendicularity, .001 in./gage length
Longitudinal [illegible] Transverse [illegible]
Flush Gage Reading, in. .002
Capacitance Gage Reading: [illegible]
Exit Burr Height, in. .007

Bluing Pin Rollout

65%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	0	0	0	0	0	0	0	0
#2	0	0	0	+0.5	0	0	0	0
#3	0	0	+0.5	+1	0	+0.5	0	0
#4	+1	+0.5	0	0	0	0	0	0
#5	+1.5	+1	0	0	0	0	0	+1

EFFECTS OF HOLE QUALITY

Test Series 18 Quality Variable W/EXIT BURR - MIN INTERFERENCE

Produce Good Hole Using Following Conditions:

Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)

Spindle, rpm 325 Feed: HAND - 0.5 IPM

Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.953

Modify Good Holes Using Following Conditions:

Tool: GROUP 2 OMARK DRILL-REAMER

Spindle, rpm 325 Feed: HAND - 0.5 IPM

Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.400

Procedure: REAM GOOD HOLE, TOUCH W/ WITH OVERSIZE REAMER WHILE NOT ROTATING, THEN FEED .080" DEEPER

Results: Specimen No. 216T **Hole #1**

Surface Finish, AA 35 μin

Protrusion, in. .114

Perpendicularity, .001 in./gage length

Longitudinal .004/INCH Transverse .004/INCH

Flush Gage Reading, in. .003

Capacitance Gage Reading: 344

Exit Burr Height, in. .008

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
	Angular Position							
Bottom #1	+ 1	+ 1	+ 0.5	+ 0.5	+ 0.5	+ 1	+ 1	+ 1
#2	+ 1	+ 0.5	+ 0.5	+ 0.5	+ 0.5	+ 1	+ 1	+ 1
#3	+ 0.5	+ 0.5	+ 2.5	+ .5	+ 1	+ 1.5	+ 1.5	+ 1
#4	+ 1	+ 1	+ 1	+ 0.5	+ 0.5	0	0	+ 1
#5	+ 1.5	+ 1.5	+ 1	+ 0.5	0	0	+ 0.5	+ 1.5

Hole #2

Surface Finish, AA 35 μin

Protrusion, in. .110

Perpendicularity, .001 in./gage length

Longitudinal 000 Transverse .003/INCH

Flush Gage Reading, in. 000

Capacitance Gage Reading: 411

Exit Burr Height, in. .020

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
	Angular Position							
Bottom #1	+ 0.5	+ 0.5	+ 1	+ 1	+ 0.5	0	0	+ 0.5
#2	+ 0.5	+ 1	+ 1	+ 1	+ 0.5	0	0	+ 0.5
#3	+ 1	+ 1	+ 1.5	+ 1.5	+ 1	0	0	0
#4	+ 1	+ 1	0.5	+ 1	+ 0.5	+ 0.5	+ 0.5	+ 0.5
#5	+ 2	+ 2	+ 1	+ 1	+ 0.5	+ 0.5	+ 1	+ 1

EFFECTS OF HOLE QUALITY

Test Series 18 Quality Variable W/O EXIT BURR - MIN INTERFERENCE

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.954

Modify Good Holes Using Following Conditions:
Tool: GROUP 2 OMARK DRILL REAMER
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.400
Procedure: REAM GOOD HOLE, TOUCH UP OVERSIZE REAMER WHILE NOT ROTATING THEN REAM .080" DEEPER

Results: Specimen No. 5A5T Hole #1
Surface Finish, AA 25 μin
Protrusion, in. .122
Perpendicularity, .001 in./gage length
Longitudinal .007 INCH Transverse .000/INCH
Flush Gage Reading, in. .000
Capacitance Gage Reading: 457
Exit Burr Height, in. DEBURRED

Bluing Pin Rollout

85%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	0	0	0	0	0	0	0	0
#2	0	0	0	0	+0.5	+0.5	+1	+0.5
#3	0	0	0	0	+0.5	+1	+1	+1
#4	+0.5	0	0	+0.5	+0.5	0	0	0
#5	+1	+0.5	+0.5	+0.5	+0.5	0	+0.5	+0.5

Hole #2

Surface Finish, AA 30 μin
Protrusion, in. .112
Perpendicularity, .001 in./gage length
Longitudinal .005/INCH Transverse .004/INCH
Flush Gage Reading, in. .002
Capacitance Gage Reading: 552
Exit Burr Height, in. DEBURRED

Bluing Pin Rollout

90%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	0	0	0	+0.5	0	0	0	0
#2	0	0	+0.5	+0.5	0	0	0	0
#3	0	0	0	+0.5	0	0	0	0
#4	0	0	0	+0.5	0	0	0	0
#5	0	0	0	+0.5	0	0	0	0.5

EFFECTS OF HOLE QUALITY

Test Series 18 Quality Variable WO/[illegible] - BURR - MIN INTERFERENCE

Produce Good Hole Using Following Conditions:

Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)

Spindle, rpm 325 Feed: HAND - 0.5 IPM

Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.954

Modify Good Holes Using Following Conditions:

Tool: GROUP 1 OMARK DRILL REAMER

Spindle, rpm 325 Feed: HAND - 0.5 IPM

Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.400

Procedure: REAM GOOD HOLE, TOUCH UP WITH OVERSIZE REAMER WHILE NOT ROTATING, THEN REAM .080 DEEPER

Results: Specimen No. 5B6C Hole #1

Surface Finish, AA 40 μ in

Protrusion, in. .120

Perpendicularity, .001 in./gage length

Longitudinal ______ Transverse ______

Flush Gage Reading, in. .001

Capacitance Gage Reading: 455

Exit Burr Height, in. .007 DEBURRED

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
	Angular Position							
Bottom #1	+ 0.5	0	0	+ 0.5	0	+ 0.5	+ 0.5	+ 0.5
#2	0	0	0	+ 0.5	+ 1	+ 1.5	+ 1	+ 1
#3	0	-0.5	0	+ 1	+ 1	+ 2	+ 1.5	+ 1
#4	+ 0.5	+ 1	+ 0.5	+ 1	+ 0.5	0	0	0
#5	+ 0.5	+ 0.5	+ 0.5	0	+ 0.5	0	0	0

Hole #2

Surface Finish, AA 30 μ in

Protrusion, in. .108

Perpendicularity, .001 in./gage length

Longitudinal ______ Transverse ______

Flush Gage Reading, in. .002

Capacitance Gage Reading: 491

Exit Burr Height, in. ~~.002~~ DEBURRED

Bluing Pin Rollout

75%

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
	Angular Position							
Bottom #1	+ 1	+ 1	0	0	+ 0.5	0	+ 0.5	+ 1
#2	0	0	0	0	0	0	0	0
#3	0	0	0	0	0	0	0	0
#4	0	0	0	+ 0.5	0	0	-0.5	0
#5	0	0	0	+ 0.5	+ 0.5	0		+ 0.5

EFFECTS OF HOLE QUALITY

Test Series 18 Quality Variable W/O EXIT BURR - MIN INTERFERENCE

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.954

Modify Good Holes Using Following Conditions:
Tool: GROUP 2 OMARK DRILL REAMER
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.400
Procedure: REAM GOOD HOLE, TOUCH UP OVERSIZE REAMER WHILE NOT ROTATING THEN REAM .080" DEEPER

Results: Specimen No. CAST [illegible] Hole #1
Surface Finish, AA 35 μ in
Protrusion, in. .114
Perpendicularity, .001 in./gage length
Longitudinal .004/INCH Transverse .003/INCH
Flush Gage Reading, in. .003
Capacitance Gage Reading: 427
Exit Burr Height, in. DEBURRED

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	+1	+1	0	0	0	+0.5	+1	+1
#2	+1	+0.5	0	0	0	+1	+1	+1
#3	+0.5	0	0	+0.5	+0.5	+1	+1	+1
#4	0	0	+1	+1.5	+1.5	+1	0	0
#5	+1	+1	+1	+1	+1	+1	+0.5	+0.5

Hole #2

Surface Finish, AA 40 μ in
Protrusion, in. .104
Perpendicularity, .001 in./gage length
Longitudinal .001/INCH Transverse .002/INCH
Flush Gage Reading, in. .001
Capacitance Gage Reading: 433
Exit Burr Height, in. DEBURRED

Bluing Pin Rollout

75%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	+0.5	-0.5	0	0	0	0	0	0
#2	+0.5	+0.5	+2.5	+0.5	0	0	0	+0.5
#3	+0.5	+0.5	+1	+1	0	+0.5	+2.5	+0.5
#4	2	0	0	+0.5	+0.5	0	0	0
#5	+1.5	+1	+1	+1	+0.5	+2.5	+2.5	+1

EFFECTS OF HOLE QUALITY

Test Series 18 Quality Variable W/O EXIT BURR - MIN INTERFERENCE

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill, 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.954

Modify Good Holes Using Following Conditions:
Tool: GROUP 2 OMARK DRILL REAMER
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.400
Procedure: REAM GOOD HOLE, TOUCH UP OVERSIZE REAMER WHILE NOT ROTATING THEN REAM .080" DEEPER

Results: Specimen No. 6AGCB Hole #1

Surface Finish, AA 35 μin
Protrusion, in. .119
Perpendicularity, .001 in./gage length
Longitudinal .003/INCH Transverse .010/INCH
Flush Gage Reading, in. .002
Capacitance Gage Reading: 460
Exit Burr Height, in. DEBURRED

Bluing Pin Rollout

60%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	+ 0.5	+ 0.5	+ 0.5	0	+ 0.5	+ 1	+ 1	+ 1
#2	+ 0.5	+ 0.5	+ 0.5	+ 0.5	+ 1	+ 1	+ 1.5	+ 1.5
#3	0	0	+ 0.5	+ 0.5	+ 1	+ 1.5	+ 1.5	+ 1
#4	+ 0.5	0	+ 0.5	+ 0.5	+ 1	+ 1	+ 2.5	+ 1
#5	+ 1	+ 1	+ 1	+ 1	+ 1	+ 1	+ 1	+ 1

Hole #2

Surface Finish, AA 40 μin
Protrusion, in. .111
Perpendicularity, .001 in./gage length
Longitudinal .003/INCH Transverse .003/INCH
Flush Gage Reading, in. [illegible]
Capacitance Gage Reading: 446
Exit Burr Height, in. DEBURRED

Bluing Pin Rollout

50%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	+ 2	+ 2	+ 2	+ 1.5	+ 1	+ 1	+ 1	+ 1
#2	+ 2	+ 1.5	+ 2	+ 2	+ 1.5	+ 1	+ 1	+ 1
#3	+ 1.5	+ 1.5	+ 2	+ 2	+ 1.5	+ 1.5	+ 1	+ 1
#4	+ 1.5	+ 1.5	+ 1.5	+ 2	+ 1.5	+ 1	+ 1	+ 1
#5	+ 2	+ 2	+ 2	+ 1.5	+ 1.5	+ 1.5	+ 1.5	+ 1.5

EFFECTS OF HOLE QUALITY

Test Series 18 Quality Variable W/O EXIT BURR - MIN INTERFERENCE

Produce Good Hole Using Following Conditions:

Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)

Spindle, rpm 325 Feed: HAND - 0.5 IPM

Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.954

Modify Good Holes Using Following Conditions:

Tool: GROUP 2 OMARK DRILL REAMER

Spindle, rpm 325 Feed: HAND - 0.5 IPM

Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.900

Procedure: REAM GOOD HOLE, TOUCH UP OVERSIZE REAMER WHILE NOT ROTATING THEN REAM .080" DEEPER

Results: Specimen No. 5E2T

Hole #1

Surface Finish, AA 35 μ in.

Protrusion, in. .113

Perpendicularity, .001 in./gage length

Longitudinal .004/INCH Transverse 000

Flush Gage Reading, in. .061

Capacitance Gage Reading: 377

Exit Burr Height, in. ~~.007~~ DEBURRED

Bluing Pin Rollout

90%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	+1	+1	+1	+0.5	0	0	0	+1
#2	+0.5	0	+1	+1	+1	+1.5	+1	+1
#3	-0.5	-0.5	+1	+1.5	+2	+2	+1.5	+0.5
#4	+1	+0.5	+1	+1	+0.5	0	0	+0.5
#5	+1	+1	+1	+1	0	0	0	+0.5

Hole #2

Surface Finish, AA 40 μ in.

Protrusion, in. .111

Perpendicularity, .001 in./gage length

Longitudinal 000 Transverse 000

Flush Gage Reading, in. 002

Capacitance Gage Reading: 434

Exit Burr Height, in. ~~.002~~ DEBURRED

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	+1	+1	+1	+0	0	0	0	+1.5
#2	+1	+1	+1.5	+1	1	0	0	+1
#3	0	+1	+1.5	+2	1	0	0	0
#4	-1	-1	-1.5	-0.5	-0.5	-1	-1	-1
#5	+0.5	+0.5	+0.5	+1	+0.5	+0.5	+0.5	+1

EFFECTS OF HOLE QUALITY

Test Series 18 Quality Variable W/EXIT BURR-MAX. INTERFERENCE

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND-0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.910

Modify Good Holes Using Following Conditions:
Tool: UNDERSIZE CARBIDE DRILL REAMER
Spindle, rpm 325 Feed: HAND-0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.954
Procedure: REAM HOLE SHALLOW, THEN CO[illegible] WITH UNDERSIZE REAMER

Results: Specimen No. 3A5T Hole #1
Surface Finish, AA 60 μin
Protrusion, in. .225
Perpendicularity, .001 in./gage length
Longitudinal .005/INCH Transverse .005/INCH
Flush Gage Reading, in. .003
Capacitance Gage Reading: 404
Exit Burr Height, in. .008

Bluing Pin Rollout

80%

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	+1	+0.5	0	0	+1	+1	+1	+1
#2	+0.5	0	-0.5	0	+1	+1	+1	+1
#3	+0.5	+1	+1	1	0	0	0	0
#4	+0.5	+0.5	0	0	0	0	0	0
#5								

Hole #2

Surface Finish, AA 60 μin
Protrusion, in. .222
Perpendicularity, .001 in./gage length
Longitudinal .003/INCH Transverse .000
Flush Gage Reading, in. .002
Capacitance Gage Reading: 442
Exit Burr Height, in. .004

Bluing Pin Rollout

80%

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	+0.5	+1	+1	+0.5	+0.5	0	0	+1
#2	0	+0.5	+0.5	+0.5	+0.5	0	0	0
#3	0	+0.5	+0.5	+0.5	+0.5	0	0	+0.5
#4	+0.5	+1	+1	+1	+1	0	0	+0.5
#5								

EFFECTS OF HOLE QUALITY

Test Series 18 Quality Variable W/EXIT BURR- MAX. INTERFERENCE

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND-0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.52
0 @ 0.200"

Modify Good Holes Using Following Conditions:
Tool: UNDERSIZE OMARK DRILL REAMER
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.952
Procedure: REAM HOLE SHALLOW BY .060" THEN CO'SINK WITH UNDERSIZE REAMER

Results: Specimen No. 5E6T Hole #1 (MARKED END)

Surface Finish, AA 40-50 μ in
Protrusion, in. .226
Perpendicularity, .001 in./gage length
Longitudinal .005/INCH Transverse .003/INCH
Flush Gage Reading, in. .003
Capacitance Gage Reading: 416 (AFTER BLUEING)
Exit Burr Height, in. .013

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	+1.5	+2.5	+3	+4	+4	+4	+3.5	+2
#2	+1	+2	+3	+4.5	+5	+5	+4	+2
#3	+1	+1	+2	+1	+1	+1	0	0
#4	-1	0	0	0	0	0	0	-0.5
#5	+10	+10	+10	+10	+10	+10	+10	+10

Hole #2

Surface Finish, AA 40-60 μ in
Protrusion, in. .221
Perpendicularity, .001 in./gage length
Longitudinal .003/INCH Transverse .000
Flush Gage Reading, in. .003
Capacitance Gage Reading: 390 (AFTER BLUEING)
Exit Burr Height, in. .010

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	+1	+2	+3	+3	+3.5	+3	+2.5	+1
#2	+1.5	+3	+4	+4	+4	+4	+3	+2
#3	-1	+1	+1.5	+1.5	+1.5	+1	0	-1
#4	0	0	0	0	0	0	0	0
#5	+10	+10	+10	+10	+10	+10	+10	+10

EFFECTS OF HOLE QUALITY

Test Series 18 Quality Variable W/ [illegible] BURR – MAX. [illegible]

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND 2.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.910

Modify Good Holes Using Following Conditions:
Tool: UNDERSIZE OMARK DRILL REAMER
Spindle, rpm 325 Feed: [illegible]
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.953
Procedure: REAM HOLE SHALLOW BY .062, CO'SINK WITH UNDERSIZE REAMER

Results: Specimen No. 4A1T Hole #1

Surface Finish, AA 63 μ in

Protrusion, in. .227

Perpendicularity, .001 in./gage length

Longitudinal .003/INCH Transverse .000

Flush Gage Reading, in. .003

Capacitance Gage Reading: 408

Exit Burr Height, in. .008

Bluing Pin Rollout

50%

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
	Angular Position							
Bottom #1	+1	-1	+0.5	+0.5	0	0	+1	+1
#2	+1	-1	+0.5	+2.5	+1	0	+1	+0.5
#3	+1.5	-1.5	+2.5	0	0	-0.5	0	0
#4	+2.5	-2	+1	0	0	0	+2.5	+1
#5	+10	+10	+10	+10	+10	+9.5	+9.5	+10

Hole #2

Surface Finish, AA 42 μ in

Protrusion, in. .222

Perpendicularity, .001 in./gage length

Longitudinal .000 Transverse .001/INCH

Flush Gage Reading, in. .003

Capacitance Gage Reading: 408

Exit Burr Height, in. .016

Bluing Pin Rollout

60%

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
	Angular Position							
Bottom #1	+0.5	0	0	-2	0	0.5	0.5	0.5
#2	0	0	+2.5	-2	+2.5	0.5	2.5	0
#3	+0.5	+0.5	+2.5	-2	0	0	0	0
#4	+2	+1.5	+1	-2	0	0	1	1
#5	+7	+7	+7	+7	+7	+7	+7	+7

EFFECTS OF HOLE QUALITY

Test Series 1B Quality Variable W/EXIT BURR - MAX. INTERFERENCE

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.905
0 @ 0.200

Modify Good Holes Using Following Conditions:
Tool: UNDERSIZE OMARK DRILL REAMER
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.954
Procedure: REAM HOLE SHALLOW BY .060" THEN C'SINK WITH UNDERSIZE REAMER

Results: Specimen No. 2R5T Hole #1 (MARKED END)
Surface Finish, AA 45 μ in
Protrusion, in. .230
Perpendicularity, .001 in./gage length
Longitudinal 000 Transverse .007/INCH
Flush Gage Reading, in. .002
Capacitance Gage Reading: 326
Exit Burr Height, in. .015

Bluing Pin Rollout

85%

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
	Angular Position							
Bottom #1	+1	+0.5	0	0	+0.5	+1.5	+1.5	+1.5
#2	0	-0.5	0	0	+0.5	+1	+1	+0.5
#3	+1	0	0	0	0	-1	-0.5	0
#4	+2	+1	+1	0	0	-0.5	0	+1
#5	+10	+10	+10	+10.5	+10	+10	+10	+10

Hole #2

Surface Finish, AA 45 μ in
Protrusion, in. .230
Perpendicularity, .001 in./gage length
Longitudinal 000 Transverse .003/INCH
Flush Gage Reading, in. .003
Capacitance Gage Reading: 308
Exit Burr Height, in. .010

Bluing Pin Rollout

90%

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
	Angular Position							
Bottom #1	+0.5	+0.5	+0.5	+0.5	+0.5	+0.5	+1	0
#2	0	0	+1	+1	+0.5	0	0	0
#3	+1	0	0	0	+1	0	0	0
#4	+2	+1.5	0	0	0	0	+1	2
#5	+10	+10	+10	+10	+10	+10	+10	10

EFFECTS OF HOLE QUALITY

Test Series 18 Quality Variable W/ EXIT BURR - MAX INTERFERENCE

Produce Good Hole Using Following Conditions:

Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)

Spindle, rpm 325 Feed: HAND - [illegible]

Cutting Fluid: STANDARD SOLVENT Depth: (Ind. Reading) 1.910

Modify Good Holes Using Following Conditions:

Tool: UNDERSIZE OMARK DRILL-REAMER

Spindle, rpm 325 Feed: HAND - 0.5 IPM

Cutting Fluid: STANDARD SOLVENT Depth: (Ind. Reading) 1.953

Procedure: REAM HOLE SHALLOW AT .060" THEN CO'SINK WITH UNDERSIZE REAMER

Results: Specimen No. 58508 Hole #1 M[illegible] E[illegible]

Surface Finish, AA 25 [illegible]

Protrusion, in. .230

Perpendicularity, .001 in./gage length

Longitudinal .010/in. Transverse .002/INCH

Flush Gage Reading, in. .003

Capacitance Gage Reading: 387

Exit Burr Height, in. .012

Bluing Pin Rollout

80%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	0	[illegible]	0		0	0	0	0
#2	0	[illegible]	0	[illegible]	0	0	0	0
#3	0	[illegible]	[illegible]	[illegible]	-0.5	-1	-1	-0.5
#4	0	-0.5	-0.5	0	-0.5	-1	-0.5	0
#5	+9	+9	+9	+9	+9	+9	+9	+9

Hole #2

Surface Finish, AA 35 [illegible]

Protrusion, in. .225

Perpendicularity, .001 in./gage length

Longitudinal .004/INCH Transverse .002/INCH

Flush Gage Reading, in. .003

Capacitance Gage Reading: 336

Exit Burr Height, in. .010

Bluing Pin Rollout

80%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	0	0	0	0	0	0	0	0
#2	-1	0	-0.5	0	0	0	0	0
#3	-1	-0.5	-1	0	[illegible]	0	-1	0
#4	0	0	-0.5	0	-1	0	0	+1
#5	+9	+9	+9	+9	+9	+9	+9	+9

EFFECTS OF HOLE QUALITY

Test Series 18 Quality Variable W/O EXIT BURR - MAX INTERFERENCE

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.915

Modify Good Holes Using Following Conditions:
Tool: UNDERSIZE OMARK DRILL REAMER
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.954
Procedure: REAM HOLE SHALLOW THEN CO'SINK WITH UNDERSIZE REAMER

Results: Specimen No. 5E4B . Hole #1
Surface Finish, AA 60 μin
Protrusion, in. .230
Perpendicularity, .001 in./gage length
Longitudinal .001/INCH Transverse .001/INCH
Flush Gage Reading, in. .003
Capacitance Gage Reading: 391
Exit Burr Height, in. DEBURRED

Bluing Pin Rollout

85%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	+0.5	0	+0.5	+0.5	+0.5	+1	+1	+1.5
#2	+1	+0.5	+1	+0.5	+0.5	+1.5	+1.5	+1.5
#3	+0.5	0	-0.5	+0.5	0	0	0	+1
#4	+1	+1	+1	+1	0	+0.5	+1	+1.5
#5								

Hole #2

Surface Finish, AA 35 μin
Protrusion, in. .240
Perpendicularity, .001 in./gage length
Longitudinal 0.0 Transverse .003/INCH
Flush Gage Reading, in. .004
Capacitance Gage Reading: 460
Exit Burr Height, in. DEBURRED

Bluing Pin Rollout

65%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	0	+0.5	0	0	-0.5	0	0	+0.5
#2	-0.5	0	0	0	-0.5	0	0	0
#3	0	0	0	0	-0.5	0	0	0
#4	+1	+1	+1	+1	0	0	+0.5	+1.5
#5								

EFFECTS OF HOLE QUALITY

Test Series 18 Quality Variable W/O EXIT BURR - MAX. INTERFERENCE

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.905

Modify Good Holes Using Following Conditions:
Tool: UNDERSIZE OMARK DRILL-REAMER
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.954
Procedure: REAM HOLE SHALLOW, THEN CO'SINK WITH UNDERSIZE REAMER

Results: Specimen No. 2A5B

Hole #1

Surface Finish, AA 55 μin
Protrusion, in. .230
Perpendicularity, .001 in./gage length
Longitudinal .004/INCH Transverse .004/INCH
Flush Gage Reading, in. .002
Capacitance Gage Reading: 286
Exit Burr Height, in. DEBURRED

Bluing Pin Rollout

85%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4								
#5								

Hole #2

Surface Finish, AA 55 μin
Protrusion, in. .231
Perpendicularity, .001 in./gage length
Longitudinal .002/INCH Transverse .001/INCH
Flush Gage Reading, in. .002
Capacitance Gage Reading: 355
Exit Burr Height, in. DEBURRED

Bluing Pin Rollout

80%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1								
#2								
#3								
#4								
#5								

EFFECTS OF HOLE QUALITY

Test Series 18 Quality Variable WC/Exit Burr - Max. Interference

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: Hand - 0.5 IPM
Cutting Fluid: Stoddard Solvent Depth: (Ind. Reading)

Modify Good Holes Using Following Conditions:
Tool: Undersize Omark Drill Reamer
Spindle, rpm 325 Feed: Hand - 0.5 IPM
Cutting Fluid: Stoddard Solvent Depth: (Ind. Reading)
Procedure: Ream hole shallow by , Co'sink with undersize reamer

Results: Specimen No. 5C/CB Hole #1
Surface Finish, AA 50 μ in.
Protrusion, in. .218
Perpendicularity, .001 in./gage length
Longitudinal 000 Transverse .005/inch
Flush Gage Reading, in. .003
Capacitance Gage Reading: 350
Exit Burr Height, in. Deburred

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	+0.5	0	0	0	0	+0.5	+1	+1
#2	+1	0	0	0	0	+0.5	+1.5	+1
#3	+0.5	+1	+1	+0.5	-0.5	0	0	0
#4	+1.5	+1.5	+1.5	+0.5	0	0	+1	+1
#5								

Hole #2

Surface Finish, AA 50 μ in.
Protrusion, in. .220
Perpendicularity, .001 in./gage length
Longitudinal 0.00 in. Transverse .005/inch
Flush Gage Reading, in. .003
Capacitance Gage Reading: 405
Exit Burr Height, in. Deburred

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	+0.5	+0.5	0	0	0	0	+0.5	+0.5
#2	0	0	0	0	0	0	+0.5	+0.5
#3	0	0	+0.5	0	0	0	0	0
#4	+0.5	+0.5	+1	0	0	0	0	0
#5								

EFFECTS OF HOLE QUALITY

Test Series 18 Quality Variable W/O EXIT BURR - MAX INTERFERENCE

Produce Good Hole Using Following Conditions:

Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)

Spindle, rpm 325 Feed: HAND - 0.5 IPM

Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.905

Modify Good Holes Using Following Conditions:

Tool: UNDERSIZE OMARK DRILL REAMER

Spindle, rpm 325 Feed: HAND - 0.5 IPM

Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.954

Procedure: REAM HOLE SHALLOW, THEN [illegible] WITH UNDERSIZE REAMER

Results: Specimen No. 5C6CB **Hole #1**

Surface Finish, AA 40 μin

Protrusion, in. .227

Perpendicularity, .001 in./gage length

Longitudinal .004/INCH Transverse .002/INCH

Flush Gage Reading, in. .002

Capacitance Gage Reading: 407

Exit Burr Height, in. DEBURRED

Bluing Pin Rollout

80%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	0	0	0	0	0	+1	+1	+1
#2	+0.5	0	-0.5	-0.5	0	+1	+2	+1.5
#3	0	0	0	0	0	0	0	0
#4	+1	+0.5	0	0	0	+0.5	+1	+1.5
#5								

Hole #2

Surface Finish, AA 40 μin

Protrusion, in. .226

Perpendicularity, .001 in./gage length

Longitudinal .005/INCH Transverse .006/INCH

Flush Gage Reading, in. .002

Capacitance Gage Reading: 330

Exit Burr Height, in. DEBURRED

Bluing Pin Rollout

85%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	0	+1	+1.5	+1.5	+1	0	0	+1
#2	0	+1	+1.5	+1.5	+1	0	0	0
#3	+1	+0.5	+0.5	+1	+0.5	0	0	0
#4	+1.5	+1.5	+1.5	+1	+1	0	0	+1
#5								

EFFECTS OF HOLE QUALITY

Test Series 18 Quality Variable W/O EXIT BURR - MAX. INTEFERENCE

Produce Good Hole Using Following Conditions:
Tools: #2 Centerdrill; 19/64 in. pilot drill; Group 1, Omark Drill Reamer (TLD2040AR1-5)
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.915

Modify Good Holes Using Following Conditions:
Tool: UNDERSIZE OMARK DRILL REAMER
Spindle, rpm 325 Feed: HAND - 0.5 IPM
Cutting Fluid: STODDARD SOLVENT Depth: (Ind. Reading) 1.955
Procedure: REAM HOLE SHALLOW, CO'SINK WITH UNDERSIZE REAMER

Results: Specimen No. 5C2B Hole #1

Surface Finish, AA 40 μin
Protrusion, in. .230
Perpendicularity, .001 in./gage length
Longitudinal .006/INCH Transverse .002/INCH
Flush Gage Reading, in. .003
Capacitance Gage Reading: 347
Exit Burr Height, in. DEBURRED

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	+ 1	+ 1	+ 0.5	0	0	+ 1	+ 1.5	+ 1.5
#2	+ 1	+ 1	+ 0.5	0	+ 0.5	+ 1.5	+ 2	+ 1.5
#3	+ 0.5	+ 1	+ 0.5	+ 1	+ 0.5	0	0	0
#4	+ 1	+ 1	+ 1	+ 1	+ 0.5	0	+ 1	+ 1
#5								

Hole #2

Surface Finish, AA 45 μin
Protrusion, in. .224
Perpendicularity, .001 in./gage length
Longitudinal .001/INCH Transverse .001/INCH
Flush Gage Reading, in. .003
Capacitance Gage Reading: 381
Exit Burr Height, in. DEBURRED

Bluing Pin Rollout

85%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	135°	180°	225°	270°	315°
Bottom #1	+ 1	+ 0.5	+ 1	+ 1	+ 0.5	+ 0.5	+ 1	+ 1
#2	+ 1	+ 0.5	+ 1	+ 1	+ 1	+ 1	+ 1	+ 1
#3	+ 0.5	+ 0.5	+ 0.5	+ 1	+ 1	+ 1	+ 0.5	+ 0
#4	+ 1	+ 0.5	+ 0.5	+ 1	+ 1	+ 1	+ 0.5	+ 1
#5								

MANUFACTURING REPORT: TAPERED HOLES

Test Series 1E19 Quality Variable ______

Specimen No. 364B

Hole Manufacturing Conditions and Procedures: ______

Spindle, rpm ______ Feed: ______

Cutting Fluid: ______ Depth: (Ind. Reading) ______

Hole #1

Surface Finish, AA 55-57

Protrusion, in. 178

Perpendicularity, .001 in./in.

Longitudinal 0 Transverse .002

Flush Gage Reading, in. .001

Capacitance Gage Reading 371

Exit Burr Height, in. ______

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-6.0	-7.0	-4.0	-6.0	-9.0	-5.0	-4.0
#2	4.0	4.0	5.0	5.0	2.0	3.0	3.0
#3	6.0	3.0	2.0	7.0	6.0	4.0	4.0
#4	5.0	5.0	2.0	2.0	2.0	3.0	4.0
#5	5.0	2.0	6.0	6.0	7.0	4.0	2.0

Hole #2

Surface Finish, AA 48-52

Protrusion, in. 172

Perpendicularity, .001 in./in.

Longitudinal .001 Transverse 0

Flush Gage Reading, in. -.002

Capacitance Gage Reading 365

Exit Burr Height, in. ______

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-8.0	-7.0	-10.0	-7.0	-9.0	-10.0	-7.0
#2	1.0	2.0	3.0	4.0	3.0	1.0	4.0
#3	4.0	5.0	6.0	5.0	5.0	4.0	5.0
#4	5.0	4.0	5.0	4.0	6.0	5.0	6.0
#5	5.0	4.0	3.0	2.0	3.0	4.0	5.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 18A Quality Variable ______
Specimen No. 4B24

Hole Manufacturing Conditions and Procedures: ______

Spindle, rpm ______ Feed: ______
Cutting Fluid: ______ Depth: (Ind. Reading) ______

Hole #1

Surface Finish, AA 35-37
Protrusion, in. 172
Perpendicularity, .001 in./in.
Longitudinal .0005 Transverse .0025
Flush Gage Reading, in. .001
Capacitance Gage Reading 374
Exit Burr Height, in. ______

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-7.0	-8.0	-10.0	-8.0	-7.0	-9.0	-8.0
#2	2.0	2.0	1.0	0	2.0	1.0	2.0
#3	3.0	2.0	2.0	3.0	3.0	2.0	3.0
#4	2.0	1.0	3.0	5.0	2.0	1.0	1.0
#5	3.0	2.0	3.0	3.0	2.0	2.0	2.0

Hole #2

Surface Finish, AA 30-32
Protrusion, in. 173
Perpendicularity, .001 in./in.
Longitudinal .002 Transverse 0
Flush Gage Reading, in. .001
Capacitance Gage Reading 414
Exit Burr Height, in. ______

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-9.0	-8.0	-9.0	-7.0	-8.0	-6.0	-8.0
#2	0	1.0	0	2.0	2.0	1.0	1.0
#3	3.0	2.0	0	3.0	3.0	3.0	4.0
#4	3.0	2.0	-1.0	4.0	5.0	3.0	5.0
#5	3.0	4.0	0	4.0	3.0	2.0	4.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 18A Quality Variable ______
Specimen No. 2C/B

Hole Manufacturing Conditions and Procedures: ______

Spindle, rpm ______ Feed: ______
Cutting Fluid: ______ Depth: (Ind. Reading) ______

Hole #1

Surface Finish, AA 40-42
Protrusion, in. .168
Perpendicularity, .001 in./in.
Longitudinal .0015 Transverse .001
Flush Gage Reading, in. 0
Capacitance Gage Reading 364
Exit Burr Height, in. ______

Bluing Pin Rollout

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-6.0	-4.0	-8.0	-8.0	-7.0	-8.0	-6.0
#2	2.0	4.0	2.0	3.0	3.0	3.0	[illegible]
#3	2.0	4.0	3.0	4.0	4.0	3.0	1.0
#4	1.0	3.0	3.0	5.0	6.0	7.0	2.0
#5	0	2.0	3.0	5.0	4.0	6.0	0

Hole #2

Surface Finish, AA 70-80
Protrusion, in. .165
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .0015
Flush Gage Reading, in. .003
Capacitance Gage Reading 395
Exit Burr Height, in. ______

Bluing Pin Rollout

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-7.0	-9.0	-8.0	-6.0	-9.0	-5.0	-8.0
#2	2.0	2.0	2.0	4.0	4.0	4.0	2.0
#3	4.0	5.0	3.0	4.0	5.0	5.0	5.0
#4	4.0	4.0	1.0	1.0	3.0	4.0	5.0
#5	3.0	4.0	1.0	1.0	4.0	3.0	5.0

INSPECTION SHEETS FOR TEST SERIES 19 -

COMBINED VARIABLES, DOGBONE STRAP SPECIMENS

MANUFACTURING REPORT: TAPERED HOLES

Test Series 19 Quality Variable SURF[illegible] [illegible]
Specimen No. 4A3TC [illegible] N. T[illegible]

Hole Manufacturing Conditions and Procedures: [illegible]
(1.625) [illegible]

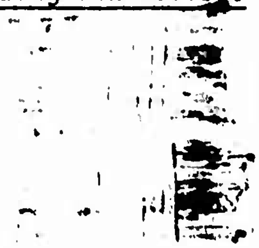
Spindle, rpm 80 Feed: .8 IPM
Cutting Fluid: DRY Depth: (Ind. Reading) 2.500

Hole #1

Surface Finish, AA 125
Protrusion, in. 110
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse .0015
Flush Gage Reading, in. .003
Capacitance Gage Reading 303
Exit Burr Height, in.

70%

Bluing Pin Rollout



Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-2.0	-4.0	-5.0	-7.0	-9.0	-6.0	-6.0
#2	5.0	4.0	4.0	4.0	4.0	4.0	4.0
#3	3.0	5.0	3.0	4.0	3.0	3.0	2.0
#4	1.0	2.0	3.0	3.0	3.0	1.0	2.0
#5	3.0	4.0	4.0	5.0	5.0	4.0	3.0

Hole #2

Surface Finish, AA 100-110
Protrusion, in. 118
Perpendicularity, .001 in./in.
Longitudinal .0005 Transverse .001
Flush Gage Reading, in. .001
Capacitance Gage Reading 242
Exit Burr Height, in.

70%

Bluing Pin Rollout

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-6.0	-4.0	-4.0	-2.0	-5.0	7.0	-6.0
#2	2.0	3.0	4.0	5.0	4.0	2.0	3.0
#3	2.0	0	3.0	4.0	3.0	4.0	4.0
#4	2.0	0	1.0	3.0	0	2.0	2.0
#5	4.0	4.0	3.0	2.0	3.0	4.0	4.0

Figure 14 - Sample Manufacturing Report: Tapered Holes

MANUFACTURING REPORT: TAPERED HOLES

Test Series 19 Quality Variable Surface Roughness 125RMS Min [illegible]
Specimen No. 2A5T6

Hole Manufacturing Conditions and Procedures: Ream Std Reamer 1.675 Ream Mod L.H. Spiral Reamer

Spindle, rpm 80 Feed: .5 8 IPM
Cutting Fluid: DRY Depth: (Ind. Reading) 2.500

Hole #1

Surface Finish, AA 100-105
Protrusion, in. 125
Perpendicularity, .001 in./in.
Longitudinal .002 Transverse .001
Flush Gage Reading, in. .002
Capacitance Gage Reading 299
Exit Burr Height, in.

70%

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-3.0	-3.0	-1.0	-6.0	-10.0	-9.0	-7.0
#2	4.0	5.0	6.0	3.0	2.0	3.0	4.0
#3	3.0	3.0	4.0	2.0	2.0	2.0	4.0
#4	3.0	0	3.0	3.0	2.0	5.0	2.0
#5	12.0	-3.0	3.0	4.0	5.0	12.0	5.0

Hole #2

Surface Finish, AA 100
Protrusion, in. 105
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse .003
Flush Gage Reading, in. .01
Capacitance Gage Reading 345
Exit Burr Height, in.

75%

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-10.0	-10.0	-8.0	-8.0	-5.0	-6.0	-7.0
#2	3.0	3.0	3.0	2.0	4.0	5.0	4.0
#3	2.0	2.0	2.0	1.0	3.0	2.0	3.0
#4	0	1.0	1.0	0	2.0	1.0	2.0
#5	3.0	4.0	4.0	3.0	3.0	3.0	2.0

Figure 14 - Sample Manufacturing Report: Tapered Holes

MANUFACTURING REPORT: TAPERED HOLES

Test Series *19* Quality Variable *SURFACE [illegible] 125 [illegible] MIN. [illegible]*
Specimen No. *4A5B*

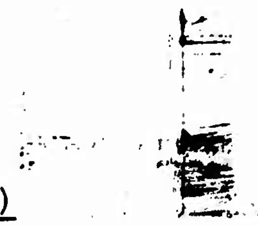
Hole Manufacturing Conditions and Procedures: *Ream Std. [illegible] 1.625 [illegible] L.H. Spiral [illegible]*

Spindle, rpm *80* Feed: *[illegible] 8 I.P.M.*
Cutting Fluid: *DRY* Depth: (Ind. Reading) *2.500*

Hole #1

Surface Finish, AA *95-100*
Protrusion, in. *.105*
Perpendicularity, .001 in./in.
Longitudinal *.0005* Transverse *.0025* *80%*
Flush Gage Reading, in. *.002*
Capacitance Gage Reading *341*
Exit Burr Height, in.

Bluing Pin Rollout



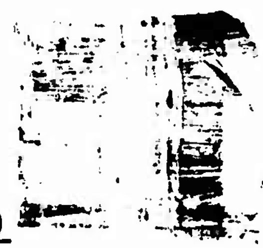
Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	180°	225°	270°	315°
Bottom #1	[illegible]	-9.0	-8.0	-4.0	-7.0	-8.0	-8.0
#2	[illegible]	1.0	2.0	4.0	3.0	2.0	2.0
#3	3.0	0	0	2.0	2.0	1.0	1.0
#4	2.0	0	-1.0	0	2.0	3.0	1.0
#5	4.0	2.0	0	0	3.0	3.0	3.0

Hole #2

Surface Finish, AA *120-125*
Protrusion, in. *.120*
Perpendicularity, .001 in./in.
Longitudinal *0* Transverse *.0025* *75%*
Flush Gage Reading, in. *.001*
Capacitance Gage Reading *323*
Exit Burr Height, in.

Bluing Pin Rollout



Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	180°	225°	270°	315°
Bottom #1	-9.0	-10.0	-7.0	-9.0	-7.0	-6.0	-7.0
#2	2.0	2.0	2.0	3.0	4.0	5.0	3.0
#3	3.0	3.0	3.0	3.0	2.0	3.0	4.0
#4	3.0	3.0	2.0	3.0	3.0	2.0	3.0
#5	4.0	3.0	3.0	3.0	3.0	3.0	3.0

Figure 14 - Sample Manufacturing Report: Tapered Holes

MANUFACTURING REPORT: TAPERED HOLES

Test Series 19 Quality Variable Surface Roughness 125 RMS
Specimen No. 4R6T Mi. N. Int.

Hole Manufacturing Conditions and Procedures: Ream Std. Reamer
.6675 Ream Mod. L.H. Spiral Reamer

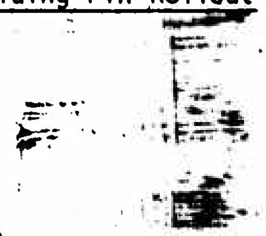
Spindle, rpm 80 Feed: 35 8 I.P.M.
Cutting Fluid: DRY Depth: (Ind. Reading) 2.500

Hole #1

Surface Finish, AA 90-105
Protrusion, in. 115
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse 0
Flush Gage Reading, in. .002
Capacitance Gage Reading 329
Exit Burr Height, in.

85%

Bluing Pin Rollout



Air Gage Readings (.0001 in.)
Angular Position

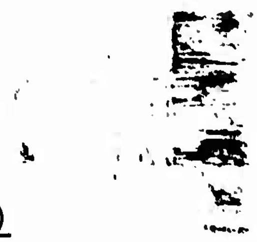
Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-10.0	-8.0	-8.0	-6.0	-8.0	-7.0	-8.0
#2	2.0	2.0	2.0	4.0	3.0	6.0	3.0
#3	3.0	2.0	1.0	2.0	2.0	4.0	3.0
#4	1.0	0	1.0	0	2.0	3.0	1.0
#5	3.0	2.0	2.0	1.0	1.0	4.0	3.0

Hole #2

Surface Finish, AA 100-110
Protrusion, in. 110
Perpendicularity, .001 in./in.
Longitudinal .002 Transverse .001
Flush Gage Reading, in. 0
Capacitance Gage Reading 326
Exit Burr Height, in.

75%

Bluing Pin Rollout



Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-7.0	-6.0	-6.0	-8.0	-11.0	-7.0	-7.0
#2	4.0	4.0	3.0	2.0	1.0	4.0	3.0
#3	4.0	3.0	1.0	2.0	2.0	3.0	3.0
#4	2.0	3.0	0	0	1.0	1.0	0
#5	3.0	3.0	2.0	2.0	3.0	3.0	3.0

Figure 14 - Sample Manufacturing Report: Tapered Holes

MANUFACTURING REPORT: TAPERED HOLES

Test Series 19 Quality Variable SURFACE ROUGHNESS 125 [illegible] [illegible]
Specimen No. 4DST

Hole Manufacturing Conditions and Procedures: REAM Std [illegible]
1.625 REAM Mod L.H. SPIRAL [illegible]

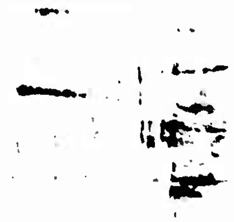
Spindle, rpm 80 Feed: [illegible]
Cutting Fluid: DRY Depth: (Ind. Reading) [illegible]

Hole #1

Surface Finish, AA 100-120
Protrusion, in. 120
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .002
Flush Gage Reading, in. .002
Capacitance Gage Reading 296
Exit Burr Height, in.

85%

Bluing Pin Rollout



Air Gage Readings (.0001 in.)
Angular Position

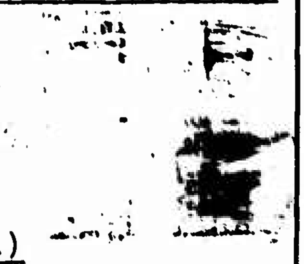
Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-8.0	-7.0	-4.0	-4.0	-7.0	-8.0	[illegible]
#2	3.0	3.0	4.0	5.0	4.0	2.0	2.0
#3	1.0	4.0	4.0	4.0	4.0	3.0	2.0
#4	4.0	4.0	3.0	1.0	4.0	5.0	4.0
#5	4.0	5.0	5.0	3.0	7.0	6.0	5.0

Hole #2

Surface Finish, AA 95-105
Protrusion, in. 100
Perpendicularity, .001 in./in.
Longitudinal .002 Transverse .0015
Flush Gage Reading, in. .001
Capacitance Gage Reading 331
Exit Burr Height, in.

90%

Bluing Pin Rollout



Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-8.0	-6.0	-4.0	-4.0	-7.0	-7.0	-9.0
#2	2.0	3.0	4.0	4.0	3.0	2.0	1.0
#3	3.0	2.0	4.0	4.0	2.0	2.0	1.0
#4	2.0	2.0	3.0	3.0	2.0	1.0	1.0
#5	4.0	4.0	5.0	3.0	3.0	4.0	3.0

Figure 14 - Sample Manufacturing Report: Tapered Holes

MANUFACTURING REPORT: TAPERED HOLES

Test Series 19 Quality Variable SURF ROUGHNESS 125 RMS
Specimen No. 4C2BC MAX INTERFERENCE (.0048)

Hole Manufacturing Conditions and Procedures: REAM WITH UNDER-SIZE REAMER (1.755), REAM WITH MOD. L.H. SPIRAL REAMER

Spindle, rpm 80 Feed: ≈ 8 IPM
Cutting Fluid: DRY Depth: (Ind. Reading) ______

Hole #1

Surface Finish, AA 110-125

Bluing Pin Rollout

Protrusion, in. 222

Perpendicularity, .001 in./in.

Longitudinal .0015 Transverse .001

90%

Flush Gage Reading, in. .001

Capacitance Gage Reading 320

Exit Burr Height, in. 100-200

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-7.0	-7.0	-8.0	-8.0	-8.0	-8.0	-7.0
#2	4.0	3.0	3.0	3.0	2.0	4.0	3.0
#3	4.0	2.0	5.0	4.0	4.0	[illegible]	3.0
#4	3.0	0	2.0	1.0	2.0	2.0	1.0
#5	13.0	13.0	13.0	10.0	11.0	13.0	12.0

Hole #2

Surface Finish, AA 100-110

Bluing Pin Rollout

Protrusion, in. 210

Perpendicularity, .001 in./in.

Longitudinal .0025 Transverse .002

85

Flush Gage Reading, in. .002

Capacitance Gage Reading 339

Exit Burr Height, in. ______

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-9.0	-8.0	-7.0	-7.0	-6.0	-10.0	-10.0
#2	2.0	2.0	3.0	3.0	3.0	2.0	2.0
#3	3.0	3.0	3.0	4.0	3.0	3.0	4.0
#4	0	1.0	1.0	0	1.0	2.0	2.0
#5	11.0	12.0	12.0	11.0	12.0	10.0	12.0

Figure 14 - Sample Manufacturing Report: Tapered Holes

MANUFACTURING REPORT: TAPERED HOLES

Test Series 19 Quality Variable Surf Roughness 125 rms
Specimen No. 3C3B Max. Interference (.004B)

Hole Manufacturing Conditions and Procedures: Ream With Under-Size Reamer (1.755), Ream With Mod. L.H. Spiral Reamer

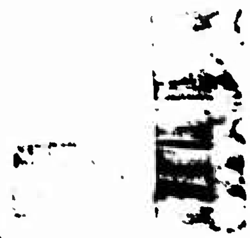
Spindle, rpm 80 Feed: 8 IPM
Cutting Fluid: Dry Depth: (Ind. Reading)

Hole #1

Surface Finish, AA 115-125
Protrusion, in. 223
Perpendicularity, .001 in./in.
Longitudinal .0005 Transverse .002
Flush Gage Reading, in. .001
Capacitance Gage Reading 334
Exit Burr Height, in.

75

Bluing Pin Rollout



Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-7.0	-7.0	-7.0	-8.0	-7.0	-7.0	-6.0
#2	2.0	2.0	3.0	3.0	4.0	3.0	3.0
#3	3.0	[illegible]	4.0	3.0	4.0	2.0	2.0
#4	2.0	0	1.0	2.0	4.0	2.0	1.0
#5	12.0	[illegible]	13.0	13.0	12.0	13.0	11.0

Hole #2

Surface Finish, AA 110-122
Protrusion, in. 230
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse 0
Flush Gage Reading, in. .001
Capacitance Gage Reading 287
Exit Burr Height, in.

80

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-2.0	-4.0	-5.0	-9.0	-9.0	-4.0	-5.0
#2	7.0	8.0	8.0	7.0	7.0	7.0	7.0
#3	5.0	6.0	5.0	5.0	5.0	5.0	4.0
#4	4.0	5.0	4.0	2.0	4.0	5.0	3.0
#5	12.0	14.0	14.0	12.0	11.0	15.0	13.0

Figure 14 - Sample Manufacturing Report: Tapered Holes

MANUFACTURING REPORT: TAPERED HOLES

Test Series 19 Quality Variable SURF ROUGHNESS 125 RMS

Specimen No. 4E4BC MAX. INTERFERENCE .0048

Hole Manufacturing Conditions and Procedures: REAM WITH UNDERSIZE REAMER (1.755), REAM WITH MOD. L.H. SPIRAL REAMER

Spindle, rpm 80 Feed: ≈ 8 IPM

Cutting Fluid: DRY Depth: (Ind. Reading)

Hole #1

Surface Finish, AA 105-115

Protrusion, in. .235

Perpendicularity, .001 in./in.

Longitudinal .0015 Transverse .003

Flush Gage Reading, in. .001

Capacitance Gage Reading 296

Exit Burr Height, in.

75%

Bluing Pin Rollout

Air Gage Readings (.0001 in.):

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-6.0	-3.0	-3.0	-8.0	-9.0	-5.0	-6.0
#2	4.0	4.0	4.0	3.0	3.0	4.0	3.0
#3	5.0	6.0	5.0	4.0	5.0	4.0	4.0
#4	5.0	5.0	4.0	5.0	5.0	2.0	4.0
#5	13.0	15.0	14.0	4.0	11.0	13.0	13.0

Hole #2

Surface Finish, AA 100 110

Protrusion, in. .223

Perpendicularity, .001 in./in.

Longitudinal 0 Transverse .0025

Flush Gage Reading, in. .001

Capacitance Gage Reading 342

Exit Burr Height, in.

70%

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-7.0	-6.0	-8.0	-8.0	-9.0	-7.0	-9.0
#2	4.0	5.0	2.0	2.0	3.0	5.0	4.0
#3	1.0	3.0	2.0	3.0	2.0	3.0	3.0
#4	0	2.0	0	1.0	2.0	1.0	1.0
#5	11.0	13.0	13.0	12.0	10.0	11.0	12.0

Figure 14 - Sample Manufacturing Report: Tapered Holes

MANUFACTURING REPORT: TAPERED HOLES

Test Series 19 Quality Variable SURF ROUGHNESS 125 RMS MAX. INT
Specimen No. 413 5 B

Hole Manufacturing Conditions and Procedures: 10048 REAM WITH [illegible] REAMER (1755) REAM WITH Mod L.H. SPIRAL REAMER

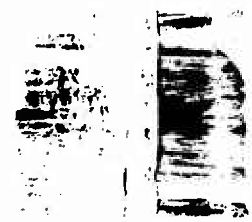
Spindle, rpm 80 Feed: 5 8 IPM
Cutting Fluid: DRY Depth: (Ind. Reading) ______

Hole #1

Surface Finish, AA 110-125
Protrusion, in. .214
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .0025
Flush Gage Reading, in. 0
Capacitance Gage Reading 340
Exit Burr Height, in. ______

90%

Bluing Pin Rollout



Air Gage Readings (.0001 in.)

Angular Position

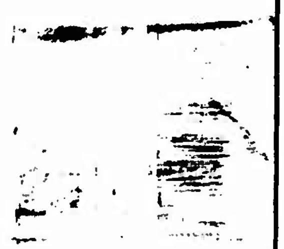
Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-8.0	-7.0	-4.0	-6.0	-8.0	-9.0	-9.0
#2	2.0	3.0	5.0	7.0	5.0	3.0	3.0
#3	3.0	3.0	3.0	4.0	3.0	3.0	4.0
#4	1.0	1.0	2.0	2.0	3.0	1.0	3.0
#5	13.0	13.0	14.0	11.0	[illegible]	12.0	11.0

Hole #2

Surface Finish, AA 110-120
Protrusion, in. .135
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse .001
Flush Gage Reading, in. .002
Capacitance Gage Reading 303
Exit Burr Height, in. ______

70%

Bluing Pin Rollout



Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-10.0	-8.0	-5.0	-5.0	-5.0	-5.0	-8.0
#2	4.0	4.0	6.0	6.0	7.0	8.0	6.0
#3	5.0	6.0	6.0	5.0	3.0	4.0	5.0
#4	5.0	5.0	4.0	2.0	3.0	3.0	4.0
#5	13.0	15.0	15.0	11.0	11.0	14.0	12.0

Figure 14 - Sample Manufacturing Report: Tapered Holes

MANUFACTURING REPORT: TAPERED HOLES

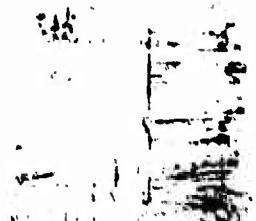
Test Series 19 Quality Variable SURF Roughness 125 [illegible]
Specimen No. 2CC13 [illegible]

Hole Manufacturing Conditions and Procedures: Ream with [illegible] Reamer (1.755) Ream with [illegible] L.H. Spiral Reamer.
Spindle, rpm 80 Feed: .5 8 I.P.M.
Cutting Fluid: Dry Depth: (Ind. Reading)

Hole #1

Surface Finish, AA 120-125
Protrusion, in. .235
Perpendicularity, .001 in./in.
Longitudinal .002 Transverse .002 75%
Flush Gage Reading, in. 0
Capacitance Gage Reading 261
Exit Burr Height, in.

Bluing Pin Rollout



Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-8.0	-1.0	-3.0	0	-1.0	-3.0	-4.0
#2	8.0	[illegible]	9.0	10.0	[illegible]	9.0	[illegible]
#3	3.0	[illegible]	7.0	5.0	5.0	6.0	6.[illegible]
#4	4.0	2.0	5.0	7.0	5.0	5.0	6.[illegible]
#5	15.0	15.0	—	14.0	15.0	—	—

Hole #2

Surface Finish, AA 105-105
Protrusion, in. .228
Perpendicularity, .001 in./in.
Longitudinal .0005 Transverse .001
Flush Gage Reading, in. 0
Capacitance Gage Reading 291 85%
Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-7.0	-7.0	-5.0	-[illegible]	-4.0	-6.0	-6.0
#2	5.0	6.0	7.0	7.0	7.0	5.0	5.0
#3	6.0	5.0	4.0	5.0	5.0	5.0	5.0
#4	4.0	3.0	2.0	5.0	3.0	2.0	3.0
#5	1[illegible].0	14.0	15.0	12.0	13.0	14.0	15.0

Figure 14 - Sample Manufacturing Report: Tapered Holes

MANUFACTURING REPORT: TAPERED HOLES

Test Series *19* Quality Variable *Surface Roughness - Scratch [illegible]*

Specimen No. *4BSTC* *[illegible] 125 [illegible]*

Hole Manufacturing Conditions and Procedures: *Ream with under-size reamer 1.75 [illegible]. Ream and L.H. [illegible] reamer. Use boring tool [illegible] .005 & pull [illegible]*

Spindle, rpm *80* Feed: *[illegible] 8. [illegible]*

Cutting Fluid: *Dry* Depth: (Ind. Reading) *2.500*

Hole #1

Surface Finish, AA *110-120*

Protrusion, in. *102*

Perpendicularity, .001 in./in.

Longitudinal *.001* Transverse *0*

Flush Gage Reading, in. *.002*

Capacitance Gage Reading *204*

Exit Burr Height, in.

65%

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	180°	225°	270°	315°
Bottom #1	4.0	4.0	5.0	4.0	4.0	4.0	3.0
#2	9.0	10.0	11.0	9.0	9.0	9.0	9.0
#3	9.0	9.0	9.0	9.0	9.0	9.0	9.0
#4	5.0	1.0	2.0	5.0	7.0	5.0	5.0
#5	4.0	0	2.0	4.0	5.0	4.0	4.0

Hole #2

Surface Finish, AA *125*

Protrusion, in. *131*

Perpendicularity, .001 in./in.

Longitudinal *.001* Transverse *.001*

Flush Gage Reading, in. *.002*

Capacitance Gage Reading *230*

Exit Burr Height, in.

70%

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	180°	225°	270°	315°
Bottom #1	-2.0	-7.0	-7.0	-5.0	-1.0	-6.0	-1.0
#2	6.0	3.0	4.0	4.0	7.0	5.0	7.0
#3	7.0	4.0	4.0	5.0	8.0	6.0	9.0
#4	8.0	3.0	4.0	6.0	5.0	6.0	9.0
#5	7.0	3.0	4.0	6.0	7.0	6.0	9.0

Figure 14 - Sample Manufacturing Report: Tapered Holes

MANUFACTURING REPORT: TAPERED HOLES

Test Series 19 Quality Variable Surface Roughness Scratch
Specimen No. 4BSBC M.N.I.T. 125

Hole Manufacturing Conditions and Procedures: Ream with Undersize Reamer 125 Ream M.D. with Spiral Reamer Use Boring Tool Set and Pull out for Scratch
Spindle, rpm 80 Feed: 5 IPM.
Cutting Fluid: DRY Depth: (Ind. Reading) 2.500

Hole #1

Surface Finish, AA 100 110
Protrusion, in. 122
Perpendicularity, .001 in./in.
Longitudinal .0005 Transverse .0015
Flush Gage Reading, in. 0
Capacitance Gage Reading 202
Exit Burr Height, in.

85%

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	0	-7.0	-8.0	0	2.0	-8.0	2.0
#2	8.0	4.0	4.0	7.0	9.0	3.0	9.0
#3	9.0	4.0	4.0	8.0	9.0	5.0	9.0
#4	10.0	5.0	5.0	9.0	10.0	2.0	10.0
#5	13.0	13.0	12.0	13.0	12.0	4.0	[illegible]

Hole #2

Surface Finish, AA 105
Protrusion, in. 127
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .002
Flush Gage Reading, in. 0
Capacitance Gage Reading 229
Exit Burr Height, in.

75%

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	0	-5.0	-7.0	-5.0	-1.0	-7.0	-3.0
#2	6.0	2.0	1.0	5.0	7.0	4.0	5.0
#3	7.0	4.0	2.0	6.0	8.0	4.0	6.0
#4	8.0	4.0	2.0	7.0	5.0	4.0	7.0
#5	8.0	5.0	4.0	6.0	13.0	5.0	6.0

Figure 14 - Sample Manufacturing Report: Tapered Holes

MANUFACTURING REPORT: TAPERED HOLES

Test Series 19　　Quality Variable Surface [illegible]
Specimen No. BB3T　　[illegible]

Hole Manufacturing Conditions and Procedures: Ream with Under-size Reamer 1.75. Ream [illegible] L.H. Spiral Reamer. Use Rolling tool [illegible]

Spindle, rpm 80　　Feed: 35 [illegible]
Cutting Fluid: [illegible]　　Depth: (Ind. Reading) 2.500

Hole #1

Surface Finish, AA 100
Protrusion, in. 114
Perpendicularity, .001 in./in.
Longitudinal .0015 Transverse .0025
Flush Gage Reading, in. 0
Capacitance Gage Reading 229
Exit Burr Height, in.

Bluing Pin Rollout

80%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	0	-3.0	-3.0	-1.0	1.0	0	2.0
#2	9.0	6.0	5.0	7.0	9.0	9.0	9.0
#3	11.0	7.0	5.0	7.0	9.0	9.0	10.0
#4	13.0	10.0	7.0	8.0	11.0	9.0	11.0
#5	—	13.0	11.0	8.0	—	10.0	10.0

Hole #2

Surface Finish, AA 95-105
Protrusion, in. 138
Perpendicularity, .001 in./in.
Longitudinal .0023 Transverse .00[illegible]
Flush Gage Reading, in. 0
Capacitance Gage Reading 236
Exit Burr Height, in.

Bluing Pin Rollout

75%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	0	-2.0	[illegible]	-3.0	0	[illegible]	-3.0
#2	7.0	5.0	[illegible]	[illegible]	[illegible]	7.0	8.0
#3	[illegible]	6.0	6.0	7.0	9.0	7.0	[illegible]
#4	[illegible]	6.0	5.0	5.0	[illegible]	9.0	8.0
#5	[illegible]	7.0	7.0	[illegible]	[illegible]	9.0	9.0

Figure 14 - Sample Manufacturing Report: Tapered Holes

MANUFACTURING REPORT: TAPERED HOLES

Test Series 19 Quality Variable Surface Roughness Screen [illegible]
Specimen No. 4E1t Min. test 125 [illegible]

Hole Manufacturing Conditions and Procedures: Ream with under-size Reamer 1.755 Ream [illegible] Ream [illegible]. Use Boring tool set .005 & roll out [illegible]

Spindle, rpm 80 Feed: 55 [illegible]
Cutting Fluid: Oil Depth: (Ind. Reading) [illegible]

Hole #1

Surface Finish, AA 110-120
Protrusion, in. 123
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .0005
Flush Gage Reading, in. .1005
Capacitance Gage Reading 217
Exit Burr Height, in.

Bluing Pin Rollout

80%

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-1.0	-5.0	-5.0	-1.0	1.0	2.0	0
#2	8.0	7.0	4.0	7.0	8.0	9.0	[illegible]
#3	10.0	8.0	4.0	8.0	9	10.0	9.0
#4	11.0	9.0	5.0	9.0	9.0	11.0	10.0
#5	13.0	13.0	12.0	11.0	10.0	[illegible]	[illegible]

Hole #2

Surface Finish, AA 110-1[illegible]
Protrusion, in. 121
Perpendicularity, .001 in./in.
Longitudinal .0005 Transverse .001
Flush Gage Reading, in. 0
Capacitance Gage Reading 222
Exit Burr Height, in.

Bluing Pin Rollout

75%

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	0	-4.0	-6.0	-2.0	0	2.0	-1.0
#2	9.0	5.0	4.0	5.0	8.0	9.0	[illegible]
#3	9.0	5.0	3.0	6.0	8.0	9.0	7.0
#4	10.0	7.0	3.0	7.0	7.0	10.0	9.0
#5	[illegible]	5.0	14.0	7.0	9.0	[illegible]	9.0

Figure 14 - Sample Manufacturing Report: Tapered Holes

MANUFACTURING REPORT: TAPERED HOLES

Test Series 19 Quality Variable Surface Roughness [illegible] 125 [illegible]
Specimen No. 4C6B

Hole Manufacturing Conditions and Procedures: Ream With Under-Size Reamer .1955. Ream [illegible] [illegible] Use Boring Tool Set .035 & Pull Out For [illegible]

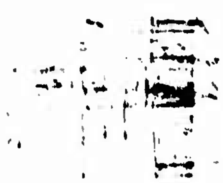
Spindle, rpm 80 Feed: .5 [illegible]
Cutting Fluid: DRY Depth: (Ind. Reading) 2.500

Hole #1

Surface Finish, AA 110-120
Protrusion, in. 116
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse .002
Flush Gage Reading, in. .002
Capacitance Gage Reading 238
Exit Burr Height, in.

75%

Bluing Pin Rollout



Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-3.0	-6.0	-9.0	-3.0	-1.0	-6.0	[illegible]
#2	7.0	3.0	3.0	7.0	7.0	6.0	[illegible]
#3	8.0	4.0	4.0	9.0	9.0	[illegible]	[illegible]
#4	9.0	4.0	5.0	10.0	9.0	[illegible]	[illegible]
#5	8.0	4.0	6.0	10.0	9.0	[illegible]	[illegible]

Hole #2

Surface Finish, AA 120-125
Protrusion, in. 130
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse .002
Flush Gage Reading, in. 0
Capacitance Gage Reading 247
Exit Burr Height, in.

80%

Bluing Pin Rollout

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-3.0	-4.0	-3.0	-8.0	-2.0	-6.0	-2.0
#2	6.0	7.0	8.0	7.0	9.0	6.0	7.0
#3	7.0	6.0	7.0	7.0	7.0	6.0	8.0
#4	7.0	[illegible]	6.0	7.0	9.0	[illegible]	9.0
#5	7.0	5.0	6.0	6.0	10.0	[illegible]	9.0

Figure 14 - Sample Manufacturing Report: Tapered Holes

MANUFACTURING REPORT: TAPERED HOLES

Test Series 19 Quality Variable Surface Roughness - Scratch
Specimen No. 2C3B MAX. Int. 125 RMS

Hole Manufacturing Conditions and Procedures: Ream with Under-size Reamer 1.255 Ream [illegible] L.H. Spiral Reamer [illegible] Use Boring tool set .005 & pull up till scratch

Spindle, rpm 80 Feed: [illegible]

Cutting Fluid: DRY Depth: (Ind. Reading) 2.400

Hole #1

Surface Finish, AA 125

Protrusion, in. .215

Perpendicularity, .001 in./in.

Longitudinal 0 Transverse .0025

Flush Gage Reading, in. 0

Capacitance Gage Reading 224

Exit Burr Height, in.

65b

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-3.0	-7.0	-10.0	-8.0	-2.0	-3.0	-3.0
#2	7.0	4.0	1.0	4.0	6.0	6.0	8.0
#3	9.0	4.0	1.0	5.0	9.0	9.0	10.0
#4	13.0	11.0	9.0	10.0	10.0	11.0	11.0
#5	10.0	13.0	13.0	13.0	10.0	11.0	12.0

Hole #2

Surface Finish, AA 125-150

Protrusion, in. .208

Perpendicularity, .001 in./in.

Longitudinal .001 Transverse .002

Flush Gage Reading, in. 0

Capacitance Gage Reading 220

Exit Burr Height, in.

76b

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-3.0	-7.0	-8.0	-7.0	-3.0	-3.0	-4.0
#2	7.0	5.0	4.0	3.0	[illegible]	7.0	7.0
#3	9.0	7.0	5.0	4.0	8.0	8.0	9.0
#4	10.0	9.0	7.0	4.0	8.0	10.0	9.0
#5	11.0	11.0	12.0	10.0	10.0	10.0	11.0

Figure 14 - Sample Manufacturing Report: Tapered Holes

MANUFACTURING REPORT: TAPERED HOLES

Test Series 17 Quality Variable Surface Roughness-Scratch
Specimen No. 4B3D

Hole Manufacturing Conditions and Procedures: Ream with Undersize Reamer [illegible]

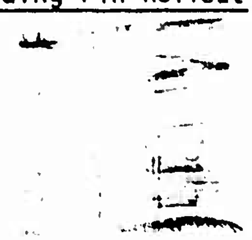
Spindle, rpm Feed:
Cutting Fluid: Depth: (Ind. Reading) 2400

Hole #1

Surface Finish, AA 115-125
Protrusion, in. 225
Perpendicularity, .001 in./in.
Longitudinal .0015 Transverse .002
Flush Gage Reading, in. 0
Capacitance Gage Reading 226
Exit Burr Height, in.

70%

Bluing Pin Rollout



Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	0	-6.0	-6.0	-3.0	-1.0	-2.0	-4.0
#2	5.0	4.0	3.0	4.0	6.0	6.0	6.0
#3	9.0	4.0	3.0	7.0	7.0	5.0	6.0
#4	10.0	5.0	3.0	7.0	7.0	12.0	6.0
#5	14.0	12.0	12.0	13.0	9.0	14.0	13.0

Hole #2

Surface Finish, AA 95-105
Protrusion, in. 227
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse .002
Flush Gage Reading, in. 0
Capacitance Gage Reading 244
Exit Burr Height, in.

75%

Bluing Pin Rollout

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-2.0	-5.0	-6.0	-5.0	-2.0	-6.0	-5.0
#2	6.0	4.0	4.0	3.0	6.0	4.0	5.0
#3	8.0	6.0	4.0	4.0	8.0	5.0	6.0
#4	9.0	6.0	4.0	3.0	7.0	4.0	7.0
#5	14.0	15.0	15.0	13.0	—	14.0	14.0

Figure 14 - Sample Manufacturing Report: Tapered Holes

MANUFACTURING REPORT: TAPERED HOLES

Test Series 19 Quality Variable Surface Roughness-Scratch Max. ... 125 RMS
Specimen No. 405B

Hole Manufacturing Conditions and Procedures: Ream with Under-Size Reamer 1.755 Ream Mod. ... [illegible]
Use Boring tool ... Drill ... [illegible]

Spindle, rpm 80 Feed: ... [illegible]
Cutting Fluid: Dry Depth: (Ind. Reading) 2400

Hole #1

Surface Finish, AA 10 ... 120 Bluing Pin Rollout
Protrusion, in. 222
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .003
Flush Gage Reading, in. 0 75%
Capacitance Gage Reading 215
Exit Burr Height, in.

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	3.0	-5.0	-1.0	0	5.0	-2.0	3.0
#2	11.0	6.0	4.0	8.0	10.0	6.0	10.0
#3	13.0	7.0	5.0	8.0	11.0	8.0	11.0
#4	15.0	9.0	6.0	10.0	11.0	8.0	12.0
#5	—	15.0	—	—	15.0	15.0	—

Hole #2

Surface Finish, AA 115-125 Bluing Pin Rollout
Protrusion, in. 220
Perpendicularity, .001 in./in.
Longitudinal .0005 Transverse .002
Flush Gage Reading, in. .001 70%
Capacitance Gage Reading 232
Exit Burr Height, in.

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	2.0	-3.0	-3.0	0	3.0	3.0	2.0
#2	10.0	7.0	6.0	8.0	10.0	11.0	11.0
#3	10.0	6.0	5.0	9.0	11.0	11.0	12.0
#4	14.0	8.0	7.0	10.0	11.0	13.0	12.0
#5	—	—	—	—	—	—	—

Figure 14 - Sample Manufacturing Report: Tapered Holes

MANUFACTURING REPORT: TAPERED HOLES

Test Series 19 Quality Variable [illegible]

Specimen No. 3U6T [illegible]

Hole Manufacturing Conditions and Procedures: [illegible]

Spindle, rpm 83 Feed: [illegible]

Cutting Fluid: Dry Depth: (Ind. Reading) [illegible]

Hole #1

Surface Finish, AA 100 110

Protrusion, in. 230

Perpendicularity, .001 in./in.

Longitudinal .003 Transverse .0015

Flush Gage Reading, in. 001

Capacitance Gage Reading 205

Exit Burr Height, in.

85%

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-3.0	-7.0	-10.0	-5.0	3.0	[illegible]	-5.0
#2	8.0	4.0	2.0	5.0	[illegible]	[illegible]	6.0
#3	9.0	6.0	[illegible]	6.0	4.0	4	[illegible]
#4	12.0	[illegible]	4	[illegible]	[illegible]	[illegible]	7.0
#5	10.0	13.0	[illegible]	12.0	14.0	7	11

Hole #2

Surface Finish, AA 120-125

Protrusion, in. 222

Perpendicularity, .001 in./in.

Longitudinal .002 Transverse .0015

Flush Gage Reading, in. .001

Capacitance Gage Reading 221

Exit Burr Height, in.

80%

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-4.0	-7.0	-6.0	-3.0	-3.0	-11.0	-3.0
#2	5.0	1.0	1.0	5.0	6.0	2.0	5.0
#3	7.0	1.0	2.0	8.0	8.0	4.0	[illegible]
#4	[illegible]	6.0	[illegible]	7.0	8.0	4.0	[illegible]
#5	[illegible]	11.0	11.0	10.0	10.0	1.0	9.0

Figure 14 - Sample Manufacturing Report: Tapered Holes

MANUFACTURING REPORT: TAPERED HOLES

Test Series 19 Quality Variable Surface Roughness - S[illegible]
Specimen No. 2E113 MAX INT. [illegible]

Hole Manufacturing Conditions and Procedures: [illegible] Ream, [illegible] Spiral Ream [illegible] USC Boring [illegible]

Spindle, rpm [illegible] Feed: [illegible]

Cutting Fluid: [illegible] Depth: (Ind. Reading) .2400

Hole #1

Surface Finish, AA 105-120

Protrusion, in. .221

Perpendicularity, .001 in./in.

Longitudinal .0 Transverse .0063

Flush Gage Reading, in. .00[illegible]

Capacitance Gage Reading 218

Exit Burr Height, in.

70%

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-4.0	-10.0	-9.0	-5.0	-3.0	[illegible]	-3.0
#2	5.0	0	-1.0	5.0	7.0	6.0	7.0
#3	8.0	2.0	0	7.0	9.0	8.0	7.0
#4	11.0	11.0	11.0	12.0	12.0	10.0	10.0
#5	10.0	12.0	12.0	[illegible]	9.0	11.0	11.0

Hole #2

Surface Finish, AA 100-110

Protrusion, in. .200

Perpendicularity, .001 in./in.

Longitudinal 0 Transverse .002

Flush Gage Reading, in. .001

Capacitance Gage Reading 232

Exit Burr Height, in.

65%

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-2.0	-5.0	-5.0	-3.0	-3.0	-2.0	-3.0
#2	4.0	4.0	3.0	6.0	6.0	3.0	7.0
#3	5.0	5.0	3.0	7.0	8.0	4.0	7.0
#4	8.0	7.0	3.0	9.0	8.0	5.0	10.0
#5	13.0	15.0	12.0	13.0	10.0	11.0	12.0

Figure 14 - Sample Manufacturing Report: Tapered Holes

MANUFACTURING REPORT: TAPERED HOLES

Test Series 19 Quality Variable Surface Roughness [illegible] MIN. INT 125 R[illegible]
Specimen No. 4E4T

Hole Manufacturing Conditions and Procedures: Ream with Under-size Reamer [illegible] Ream [illegible] L.H. Spiral [illegible] Use M[illegible] L.H. Spiral Reamer Push-[illegible]

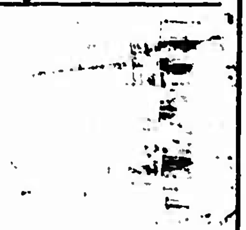
Spindle, rpm 83 Feed: [illegible] 8 IPM
Cutting Fluid: DRY Depth: (Ind. Reading) 2.5[illegible]

Hole #1

Surface Finish, AA 100-105
Protrusion, in. .121
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse .0005
Flush Gage Reading, in. 0
Capacitance Gage Reading 276
Exit Burr Height, in.

80%

Bluing Pin Rollout



Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-14.0	-14.0	-15.0	-12.0	-13.0	-14.0	-14.0
#2	2.0	2.0	5.0	3.0	1.0	2.0	2.0
#3	3.0	3.0	3.0	4.0	2.0	5.0	3.0
#4	3.0	2.0	2.0	3.0	1.0	4.0	1.0
#5	2.0	2.0	3.0	4.0	2.0	4.0	2.0

Hole #2

Surface Finish, AA 95-110
Protrusion, in. .116
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .0005
Flush Gage Reading, in. 0
Capacitance Gage Reading 312
Exit Burr Height, in.

80%

Bluing Pin Rollout

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-14.0	-15.0	-12.0	-14.0	-14.0	[illegible]	[illegible]
#2	2.0	2.0	2.0	1.0	2.0	2.0	2.0
#3	2.0	1.0	2.0	2.0	3.0	2.0	3.0
#4	2.0	1.0	2.0	1.0	1.0	0	2.0
#5	3.0	2.0	3.0	1.0	2.0	1.0	2.0

Figure 14 - Sample Manufacturing Report: Tapered Holes

MANUFACTURING REPORT: TAPERED HOLES

Test Series 19 Quality Variable SURFACE ROUGHNESS - RIFLING
Specimen No. 206B MIN. INT. 125RMS

Hole Manufacturing Conditions and Procedures: REAM WITH UNDER-SIZE REAMER 1.955 REAM M10D L.H. SPIRAL REAMER USE MOD. L.H. SPIRAL REAMER PUSH-IN 400-500 NO RPM

Spindle, rpm 80 Feed: 5-8 IPM
Cutting Fluid: DRY Depth: (Ind. Reading) 2.500

Hole #1

Surface Finish, AA 110-120
Protrusion, in. 109
Perpendicularity, .001 in./in.
Longitudinal .0005 Transverse .001
Flush Gage Reading, in. 0
Capacitance Gage Reading 275
Exit Burr Height, in.

Bluing Pin Rollout

75%

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-12.0	-14.0	-15.0	-13.0	-13.0	-12.0	—
#2	3.0	3.0	2.0	3.0	3.0	3.0	2.0
#3	4.0	3.0	2.0	4.0	4.0	6.0	2.0
#4	4.0	3.0	4.0	3.0	3.0	3.0	1.0
#5	4.0	4.0	4.0	3.0	3.0	4.0	2.0

Hole #2

Surface Finish, AA 100-105
Protrusion, in. 115
Perpendicularity, .001 in./in.
Longitudinal .002 Transverse .002
Flush Gage Reading, in. 0
Capacitance Gage Reading 266
Exit Burr Height, in.

Bluing Pin Rollout

80%

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-11.0	-13.0	-13.0	-14.0	-12.0	-12.0	-11.0
#2	3.0	1.0	2.0	1.0	3.0	4.0	4.0
#3	5.0	2.0	1.0	2.0	4.0	4.0	4.0
#4	4.0	2.0	-1.0	3.0	3.0	2.0	3.0
#5	4.0	2.0	0	2.0	3.0	4.0	3.0

Figure 14 - Sample Manufacturing Report: Tapered Holes

MANUFACTURING REPORT: TAPERED HOLES

Test Series 19 Quality Variable Surface Roughness - Rifling [illegible]
Specimen No. 401B Min. Int. [illegible]

Hole Manufacturing Conditions and Procedures: Ream with Under-size Reamer .1255 [illegible] Reamer [illegible] Spiral Reamer [illegible] No RPM

Spindle, rpm 80 Feed: [illegible]
Cutting Fluid: DRY Depth: (Ind Reading) [illegible]

Hole #1

Surface Finish, AA 100-105
Protrusion, in. 116
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse .0015
Flush Gage Reading, in. .001
Capacitance Gage Reading 304
Exit Burr Height, in.

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-15.0	—	-14.0	-15.0	-12.0	-12.0	-15.0
#2	2.0	2.0	4.0	3.0	3.0	2.0	2.0
#3	1.0	1.0	3.0	3.0	4.0	3.0	2.0
#4	1.0	2.0	4.0	2.0	2.0	1.0	1.0
#5	2.0	3.0	3.0	3.0	3.0	3.0	3.0

Hole #2

Surface Finish, AA 120-125
Protrusion, in. 120
Perpendicularity, .001 in./in.
Longitudinal .0005 Transverse .0015
Flush Gage Reading, in. .002
Capacitance Gage Reading 266
Exit Burr Height, in.

Bluing Pin Rollout

75%

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-9.0	-12.0	-13.0	-13.0	-8.0	-9.0	-12.0
#2	4.0	3.0	2.0	2.0	4.0	3.0	3.0
#3	5.0	3.0	3.0	2.0	4.0	3.0	4.0
#4	4.0	3.0	3.0	2.0	4.0	1.0	2.0
#5	4.0	3.0	3.0	4.0	5.0	3.0	3.0

Figure 14 - Sample Manufacturing Report: Tapered Holes

MANUFACTURING REPORT: TAPERED HOLES

Test Series *19* Quality Variable *Surface Roughness - R. [illegible]*
Specimen No. *4D1T* *[illegible] 125 R.M.S.*

Hole Manufacturing Conditions and Procedures: *Ream with Under-size Reamer [illegible] Ream [illegible] with Spiral Reamer Use [illegible] Spiral Reamer [illegible] 400-500 [illegible]*

Spindle, rpm *80* Feed: *[illegible]*
Cutting Fluid: *DRY* Depth: (Ind. Reading) *2.500*

Hole #1

Surface Finish, AA *100-110*
Protrusion, in. *108*
Perpendicularity, .001 in./in.
Longitudinal *.002* Transverse *.001*
Flush Gage Reading, in. *.002*
Capacitance Gage Reading *295*
Exit Burr Height, in.

70%

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-14.0	-14.0	-14.0	-14.0	-12.0	-15.0	-14.0
#2	2.0	2.0	3.0	3.0	3.0	3.0	[illegible]
#3	1.0	2.0	3.0	[illegible]	3.0	5.0	[illegible]
#4	1.0	2.0	2.0	1.0	0	1.0	[illegible]
#5	2.0	2.0	3.0	2.0	1.0	3.0	2.0

Hole #2

Surface Finish, AA *110-115*
Protrusion, in. *111*
Perpendicularity, .001 in./in.
Longitudinal *.001* Transverse *.002*
Flush Gage Reading, in. *.002*
Capacitance Gage Reading *288*
Exit Burr Height, in.

75%

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-13.0	-13.0	-14.0	-14.0	-12.0	-11.0	-13.0
#2	3.0	2.0	3.0	3.0	2.0	4.0	5.0
#3	3.0	2.0	4.0	2.0	3.0	4.0	4.0
#4	3.0	[illegible]	4.0	2.0	2.0	[illegible]	3.0
#5	3.0	4.0	4.0	2.0	2.0	3.0	4.0

Figure 14 - Sample Manufacturing Report: Tapered Holes

MANUFACTURING REPORT: TAPERED HOLES

Test Series 19 Quality Variable SURFACE ROUGHNESS - RIFLING M.N. INT. 125 RMS
Specimen No. 4C2FC

Hole Manufacturing Conditions and Procedures: REAM WITH UNDER-SIZE REAMER 1755 REAM MOD. L.H. SPIRAL REAMER USE MOD L.H. SPIRAL REAMER PUSH IN 400-500 NO RNAT

Spindle, rpm 80 Feed: 55 RIRAM.
Cutting Fluid: DRY Depth: (Ind. Reading) 2.500

Hole #1

Surface Finish, AA 120-125
Protrusion, in. 122
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse .001
Flush Gage Reading, in. .001
Capacitance Gage Reading 387
Exit Burr Height, in.

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	180°	225°	270°	315°
Bottom #1	-14.0	-15.0	-11.0	-14.0	-12.0	-10.0	-14.0
#2	3.0	3.0	4.0	3.0	4.0	5.0	3.0
#3	3.0	3.0	5.0	4.0	3.0	6.0	3.0
#4	2.0	2.0	2.0	3.0	3.0	3.0	2.0
#5	3.0	3.0	3.0	3.0	3.0	4.0	3.0

Hole #2

Surface Finish, AA 125-150
Protrusion, in. 118
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse .001
Flush Gage Reading, in. .001
Capacitance Gage Reading 269
Exit Burr Height, in.

Bluing Pin Rollout

85%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	180°	225°	270°	315°
Bottom #1	-7.0	-14.0	-9.0	-14.0	-11.0	-9.0	-13.0
#2	4.0	3.0	4.0	2.0	4.0	3.0	3.0
#3	5.0	4.0	5.0	4.0	5.0	4.0	4.0
#4	5.0	3.0	3.0	5.0	5.0	2.0	3.0
#5	6.0	4.0	4.0	5.0	5.0	3.0	3.0

Figure 14 - Sample Manufacturing Report: Tapered Holes

MANUFACTURING REPORT: TAPERED HOLES

Test Series 19 Quality Variable Surface Roughness-Rifling / Max. Int. 125 RMS
Specimen No. 2B4B

Hole Manufacturing Conditions and Procedures: Ream with under-size reamer .755 Ream. R.D. L.H. Spiral Reamer Use R.D. L.H. Spiral Reamer Push ... 400:500 ... RPM

Spindle, rpm 80 Feed: 55 R.E.P. ...
Cutting Fluid: DRY Depth: (Ind. Reading) 2.400

Hole #1

Surface Finish, AA 100-110
Protrusion, in. 210
Perpendicularity, .001 in./in.
Longitudinal .002 Transverse .0015 70%
Flush Gage Reading, in. .002
Capacitance Gage Reading 294
Exit Burr Height, in.

Bluing Pin Rollout

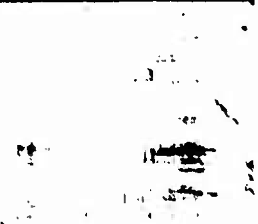
Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-15.0	-15.0	-14.0	-13.0	-10.0	-12.0	-14.0
#2	3.0	3.0	3.0	2.0	3.0	3.0	4.0
#3	3.0	2.0	4.0	3.0	3.0	2.0	3.0
#4	3.0	2.0	4.0	1.0	2.0	2.0	2.0
#5	11.0	8.0	10.0	8.0	8.0	9.0	10.0

Hole #2

Surface Finish, AA 125-135
Protrusion, in. 212
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .0005 70%
Flush Gage Reading, in. .001
Capacitance Gage Reading 265
Exit Burr Height, in.

Bluing Pin Rollout



Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-12.0	-13.0	-12.0	-8.0	-10.0	-10.0	-14.0
#2	3.0	2.0	3.0	3.0	3.0	4.0	3.0
#3	4.0	5.0	6.0	2.0	3.0	5.0	4.0
#4	5.0	5.0	5.0	1.0	3.0	3.0	4.0
#5	12.0	12.0	10.0	10.0	9.0	10.0	10.0

Figure 14 - Sample Manufacturing Report: Tapered Holes

MANUFACTURING REPORT: TAPERED HOLES

Test Series 19 Quality Variable Surface Roughness [illegible]
Specimen No. 2F313

Hole Manufacturing Conditions and Procedures: Ream with [illegible] size reamer, 1.755 ream and L.H. spiral reamer [illegible] use mod. L.H. spiral reamer push [illegible] no RPM.

Spindle, rpm [illegible] Feed: [illegible]
Cutting Fluid: [illegible] Depth: (Ind. Reading) 2.400

Hole #1

Surface Finish, AA 110-120
Protrusion, in. 211
Perpendicularity, .001 in./in.
Longitudinal .0015 Transverse 0
Flush Gage Reading, in. .001
Capacitance Gage Reading 291
Exit Burr Height, in.

Bluing Pin Rollout

75%

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-12.0	-12.0	[illegible]	-10.0	-8.0	[illegible]	-12.0
#2	5.0	3.0	[illegible]	2.0	3.0	4.0	4.0
#3	4.0	4.0	[illegible]	3.0	5.0	5.0	4.0
#4	3.0	4.0	[illegible]	3.0	4.0	5.0	3.0
#5	11.0	11.0	[illegible]	11.0	11.0	12.0	11.0

Hole #2

Surface Finish, AA 95-110
Protrusion, in. 217
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse 0
Flush Gage Reading, in. .00[illegible]
Capacitance Gage Reading 288
Exit Burr Height, in.

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-13.0	-14.0	-9.0	-14.0	-13.0	-13.0	[illegible]
#2	3.0	3.0	5.0	[illegible]	3.0	[illegible]	[illegible]
#3	3.0	2.0	4.0	[illegible]	3.0	3.0	[illegible]
#4	3.0	1.0	2.0	1.0	3.0	4.0	[illegible]
#5	10.0	10.0	10.0	[illegible]	9.0	10.0	10.0

Figure 14 - Sample Manufacturing Report: Tapered Holes

MANUFACTURING REPORT: TAPERED HOLES

Test Series *19* Quality Variable *Surface Roughness-Pitting MAX Int. 125 [illegible]*
Specimen No. *202B*

Hole Manufacturing Conditions and Procedures: *Ream with Under-size Reamer .125". Ream Mod. with Spiral Reamer. Use Mod. with Spiral Reamer [illegible] 40 [illegible] RPM.*

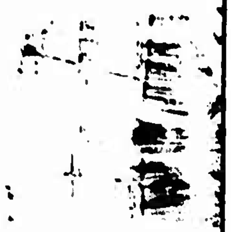
Spindle, rpm *80* Feed: *5 R.I.P.M.*
Cutting Fluid: *DRY* Depth: (Ind. Reading) *2.400*

Hole #1

Surface Finish, AA *110 120*
Protrusion, in. *210*
Perpendicularity, .001 in./in.
Longitudinal *.001* Transverse *0*
Flush Gage Reading, in. *0*
Capacitance Gage Reading *290*
Exit Burr Height, in.

65%

Bluing Pin Rollout



Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-8.0	-9.0	-9.0	-10.0	-9.0	-9.0	-9.0
#2	5.0	2.0	2.0	3.0	4.0	4.0	5.0
#3	3.0	2.0	3.0	3.0	4.0	3.0	2.0
#4	2.0	2.0	4.0	3.0	4.0	5.0	1.0
#5	10.0	10.0	10.0	8.0	10.0	9.0	10.0

Hole #2

Surface Finish, AA *120-125*
Protrusion, in. *211*
Perpendicularity, .001 in./in.
Longitudinal *.002* Transverse *.0015*
Flush Gage Reading, in. *.001*
Capacitance Gage Reading *311*
Exit Burr Height, in.

70%

Bluing Pin Rollout

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-13.0	-14.0	-14.0	-15.0	-14.0	-14.0	-15.0
#2	3.0	2.0	3.0	2.0	4.0	4.0	3.0
#3	3.0	3.0	3.0	2.0	4.0	4.0	3.0
#4	2.0	3.0	1.0	1.0	4.0	3.0	3.0
#5	9.0	10.0	8.0	7.0	10.0	5.0	10.0

Figure 14 - Sample Manufacturing Report: Tapered Holes

MANUFACTURING REPORT: TAPERED HOLES

Test Series 19 Quality Variable SURFACE ROUGHNESS, RIFLING [illegible] 125 RMS

Specimen No. 3C1B

Hole Manufacturing Conditions and Procedures: REAM WITH UNDER-SIZE REAMER 1.25 REAM MOD. L.H. SPIRAL REAMER USE MOD L.H. SPIRAL REAMER PUSH-IN 400-500 NO. RPM.

Spindle, rpm 80 Feed: [illegible]

Cutting Fluid: DRY Depth: (Ind. Reading) 2.400

Hole #1

Surface Finish, AA 120-125 Bluing Pin Rollout

Protrusion, in. 212

Perpendicularity, .001 in./in.

Longitudinal .0015 Transverse .002

Flush Gage Reading, in. .002

Capacitance Gage Reading 301

Exit Burr Height, in.

656

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-13.0	-14.0	-13.0	-11.0	-11.0	-10.0	-12.0
#2	5.0	2.0	3.0	5.0	4.0	4.0	5.0
#3	4.0	3.0	5.0	4.0	4.0	2.0	4.0
#4	3.0	3.0	4.0	4.0	4.0	10.0	3.0
#5	10.0	11.0	11.0	8.0	8.0	13.0	11.0

Hole #2

Surface Finish, AA 110-120 Bluing Pin Rollout

Protrusion, in. 205

Perpendicularity, .001 in./in.

Longitudinal .0015 Transverse .002

Flush Gage Reading, in. .002

Capacitance Gage Reading 310

Exit Burr Height, in.

756

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-13.0	-11.0	-14.0	-12.0	-13.0	-10.0	-12.0
#2	2.0	3.0	3.0	3.0	4.0	4.0	3.0
#3	3.0	3.0	5.0	4.0	4.0	4.0	4.0
#4	1.0	3.0	4.0	4.0	10.0	4.0	4.0
#5	10.0	11.0	9.0	5.0	13.0	11.0	10.0

Figure 14 - Sample Manufacturing Report: Tapered Holes

MANUFACTURING REPORT: TAPERED HOLES

Test Series 19   Quality Variable SURFACE Roughness – [illegible] MAX. [illegible] 125 [illegible]
Specimen No. 2 B 1 T

Hole Manufacturing Conditions and Procedures: Ream with Under-Size Reamer .1755 Ream [illegible] with Spiral Reamer use [illegible] with Spiral Reamer [illegible] No [illegible]

Spindle, rpm 80   Feed: [illegible] 8 IPM
Cutting Fluid: DRY   Depth: (Ind. Reading) 2.400

Hole #1

Surface Finish, AA 125
Protrusion, in. .218
Perpendicularity, .001 in./in.
Longitudinal .002 Transverse 0
Flush Gage Reading, in. 0
Capacitance Gage Reading 295
Exit Burr Height, in.

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-14.0	-13.0	-10.0	-12.0	-1[illegible]	-10.0	-12.0
#2	2.0	2.0	3.0	3.0	[illegible]	3.0	3.0
#3	4.0	3.0	4.0	2.0	[illegible]	4.0	4.0
#4	4.0	1.0	2.0	3.0	3.0	3.0	3.0
#5	9.0	11.0	10.0	11.0	10.0	12.0	8.0

Hole #2

Surface Finish, AA 100-110
Protrusion, in. .205
Perpendicularity, .001 in./in.
Longitudinal .0015 Transverse 0
Flush Gage Reading, in. .001
Capacitance Gage Reading 338
Exit Burr Height, in.

Bluing Pin Rollout

80%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-15.0	—	-15.0	-14.0	-14.0	-14.0	-15.0
#2	2.0	2.0	2.0	2.0	2.0	2.0	2.0
#3	2.0	2.0	2.0	3.0	3.0	3.0	3.0
#4	1.0	1.0	2.0	2.0	3.0	2.0	3.0
#5	8.0	7.0	9.0	[illegible]	8.0	9.0	7.0

Figure 14 - Sample Manufacturing Report: Tapered Holes

MANUFACTURING REPORT: TAPERED HOLES

Test Series 19 Quality Variable SURFACE ROUGHNESS ONLY [illegible] 125 RMS
Specimen No. 4C3P

Hole Manufacturing Conditions and Procedures: REAM UNDERSIZE [illegible] [illegible] [illegible] [illegible] [illegible] 120 ± .006 [illegible]

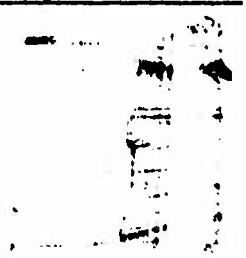
Spindle, rpm 80 Feed: .55 8 IPM
Cutting Fluid: Dry Depth: (Ind. Reading) 2.500

Hole #1

Surface Finish, AA 100
Protrusion, in. 125
Perpendicularity, .001 in./in.
Longitudinal .0015 Transverse .0015
Flush Gage Reading, in. 0
Capacitance Gage Reading 272
Exit Burr Height, in.

55%

Bluing Pin Rollout



Air Gage Readings (.0001 in.)
Angular Position

319/325

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-10.0	-11.0	-11.0	-6.0	-5.0	-5	-1.0
#2	3.0	4.0	4.0	6.0	2.0	5.0	5.0
#3	5.0	5.0	6.0	7.0	5.0	9.0	6.0
#4	7.0	8.0	1.0	6.0	11.0	12.0	9.0
#5	7.0	10.0	12.0	7.0	11.0	11.0	11.0

Hole #2

Surface Finish, AA 100 125
Protrusion, in. 110
Perpendicularity, .001 in./in.
Longitudinal .0005 Transverse .002
Flush Gage Reading, in. -.001
Capacitance Gage Reading 279
Exit Burr Height, in.

60%

Bluing Pin Rollout

Air Gage Readings (.0001 in.)
Angular Position

322/325

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-7.0	-9.0	-12.0	-11.0	-11.0	-11.0	-9.0
#2	6.0	5.0	5.0	4.0	5.0	4.0	5.0
#3	9.0	5.0	7.0	5.0	5.0	6.0	5.0
#4	6.0	5.0	12.0	5.0	9.0	11.0	7.0
#5	7.0	[illegible]	12.0	5.0	12.0	11.0	10.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 19 Quality Variable SURFACE ROUGHNESS - QUALITY MIN. INT. 125 RHR

Specimen No. 4ES13

Hole Manufacturing Conditions and Procedures: [illegible]

Spindle, rpm 8[illegible] Feed: [illegible]

Cutting Fluid: Dry Depth: (Ind. Reading) [illegible]

Hole #1

Surface Finish, AA 100-1[illegible]

Protrusion, in. 121

Perpendicularity, .001 in./in.

Longitudinal .001 Transverse 0

Flush Gage Reading, in. 0

Capacitance Gage Reading 255

Exit Burr Height, in.

Bluing Pin Rollout

60%

Air Gage Readings (.0001 in.)

319/320

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-9.0	-12.0	-9.0	-5.0	-5.0	-9.0	-8.0
#2	6.0	3.0	5.0	7.0	7.0	6.0	6.0
#3	7.0	10.0	12.0	8.0	9.0	11.0	8.0
#4	8.0	13.0	13.0	8.0	13.0	12.0	11.0
#5	10.0	10.0	10.0	7.0	11.0	12.0	12.0

Hole #2

Surface Finish, AA 12[illegible]-130

Protrusion, in. 112

Perpendicularity, .001 in./in.

Longitudinal .001 Transverse .0015

Flush Gage Reading, in. 0

Capacitance Gage Reading 279

Exit Burr Height, in.

Bluing Pin Rollout

65%

Air Gage Readings (.0001 in.)

Angular Position

3[illegible]/3[illegible]

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-9.0	-10.0	-11.0	-9.0	-9.0	-10.0	-10.0
#2	5.0	5.0	5.0	5.0	6.0	5.0	5.0
#3	7.0	7.0	5.0	5.0	5.0	7.0	7.0
#4	6.0	6.0	7.0	5.0	5.0	11.0	6.0
#5	7.0	9.0	11.0	5.0	9.0	11.0	8.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 19 Quality Variable [illegible]
Specimen No. [illegible]

Hole Manufacturing Conditions and Procedures: [illegible]

Spindle, rpm 80 Feed: [illegible]
Cutting Fluid: Dry Depth: (Ind. Reading) [illegible]

Hole #1

Surface Finish, AA 1[illegible]
Protrusion, in. 118
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .001
Flush Gage Reading, in. 0
Capacitance Gage Reading 267
Exit Burr Height, in.

70%

Bluing Pin Rollout

31[illegible] / 325

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-9.0	[illegible]	-9.0	-9.0	[illegible]	-9.0	[illegible]
#2	5.0	4.0	5.0	5.0	[illegible]	4.0	5.0
#3	5.0	11.0	11.0	6.0	[illegible]	6.0	[illegible]
#4	7.0	13.0	13.0	4.0	[illegible]	[illegible]	[illegible]
#5	9.0	11.0	12.0	4.0	[illegible]	[illegible]	[illegible]

Hole #2

Surface Finish, AA 25
Protrusion, in. 112
Perpendicularity, .001 in./in.
Longitudinal .0015 Transverse .004
Flush Gage Reading, in. T.001
Capacitance Gage Reading 247
Exit Burr Height, in.

65%

Bluing Pin Rollout

319 / 327

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-7.0	-6.0	-8.0	-8.0	[illegible]	-3.0	-9.0
#2	6.0	[illegible]	4.0	5.0	7.0	11.0	4.0
#3	7.0	[illegible]	6.0	7.0	1[illegible]	14.0	6.0
#4	6.0	[illegible]	9.0	8.0	1[illegible]	15.0	[illegible]
#5	7.0	[illegible]	10.0	7.0	1[illegible]	1[illegible]	[illegible]

MANUFACTURING REPORT: TAPERED HOLES

Test Series 19 Quality Variable SURFACE-ROUGHNESS-QUALITY
Specimen No. 2B3T MIN. INT. 125RMS

Hole Manufacturing Conditions and Procedures: REAM UNDER SIZE [illegible] REAM [illegible] L.H. SPIRAL REAMER USE [illegible] [illegible] DIAM. [illegible] IN TRANSVERSE [illegible]

Spindle, rpm 80 Feed: [illegible]
Cutting Fluid: DRY Depth: (Ind. Reading) [illegible]

Hole #1

Surface Finish, AA 100-105
Protrusion, in. 128
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .0025
Flush Gage Reading, in. 0
Capacitance Gage Reading 339
Exit Burr Height, in.

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)
Angular Position

319 / 325

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-8.0	-3.0	-2.0	-4.0	-5.0	-9.0	-7.0
#2	7.0	3.0	4.0	5.0	6.0	7.0	9.0
#3	4.0	9.0	9.0	7.0	8.0	8.0	[illegible]
#4	5.0	11.0	12.0	6.0	7.0	11.0	[illegible]
#5	8.0	[illegible]	12.0	5.0	9.0	11.0	[illegible]

Hole #2

Surface Finish, AA 115-125
Protrusion, in. 110
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse .003
Flush Gage Reading, in. 0
Capacitance Gage Reading 310
Exit Burr Height, in.

Bluing Pin Rollout

65%

Air Gage Readings (.0001 in.)
Angular Position

319 / 324

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-13.0	-11.0	-12.0	-13.0	-15.0	-12.0	-15.0
#2	4.0	4.0	3.0	[illegible]	5.0	5.0	3.0
#3	[illegible]	4.0	3.0	4.0	4.0	4.0	3.0
#4	3.0	3.0	7.0	4.0	8.0	9.0	1.0
#5	[illegible]	9.0	10.0	4.0	10.0	10.0	4.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 19 Quality Variable [illegible]
Specimen No. 4B2B

Hole Manufacturing Conditions and Procedures: [illegible] UNDERSIZE REAMER .755 [illegible] L.H. SPIRAL REAMER USE STRAIGHT FLUTE REAMER [illegible] .170 ± .005 IN [illegible] POS.

Spindle, rpm 80 Feed: 8 IPM
Cutting Fluid: DRY Depth: (Ind. Reading) 2.500

Hole #1

Surface Finish, AA 10 Bluing Pin Rollout
Protrusion, in. 118
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse .001
Flush Gage Reading, in. .001 70%
Capacitance Gage Reading 309
Exit Burr Height, in.

319
322

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-10.0	-10.0	-11.0	-12.0	-15.0	-15.0	-12.0
#2	5.0	5.0	4.0	5.0	5.0	4.0	4.0
#3	5.0	5.0	7.0	4.0	3.0	4.0	4.0
#4	4.0	16.0	11.0	2.0	2.0	7.0	6.0
#5	7.0	11.0	[illegible]	4.0	6.0	10.0	16.0

Hole #2

Surface Finish, AA 10 Bluing Pin Rollout
Protrusion, in. 118
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .001
Flush Gage Reading, in. 0 75%
Capacitance Gage Reading 266
Exit Burr Height, in.

319
326

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-10.0	-10.0	-11.0	-9.0	-11.0	-9.0	-10.0
#2	3.0	4.0	2.0	4.0	3.0	4.0	4.0
#3	5.0	5.0	8.0	6.0	7.0	8.0	6.0
#4	5.0	[illegible]	12.0	6.0	11.0	11.0	5.0
#5	6.0	10.0	11.0	7.0	10.0	11.0	7.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 19 Quality Variable SURFACE-ROUGHNESS-OVALITY
Specimen No. 2E4B MAX INT. 125 [illegible]

Hole Manufacturing Conditions and Procedures: REAM UNDER [illegible] REAMER 1.755 REAM [illegible] L.H. [illegible] REAMER [illegible] STRAIGHT FLUTE REAMER [illegible] 1700 [illegible] IN TRANSVERSE [illegible]

Spindle, rpm 80 Feed: [illegible]
Cutting Fluid: DRY Depth: (Ind. Reading) [illegible]

Hole #1

Surface Finish, AA 110
Protrusion, in. .315
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .001
Flush Gage Reading, in. .001
Capacitance Gage Reading 248
Exit Burr Height, in.

Bluing Pin Rollout

65%

317
325

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-8.0	-7.0	-7.0	-7.0	-5.0	-[illegible]	-[illegible]
#2	7.0	10.0	10.0	7.0	8.0	10.0	[illegible]
#3	12.0	13.0	13.0	9.0	12.0	13.0	[illegible]
#4	14.0	14.0	14.0	11.0	12.0	15.0	14.0
#5	[illegible]	14.0	14.0	13.0	[illegible]	13.0	13.0

Hole #2

Surface Finish, AA 110
Protrusion, in. .321
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .003
Flush Gage Reading, in. 0
Capacitance Gage Reading 248
Exit Burr Height, in.

Bluing Pin Rollout

70%

317
325

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-8.0	-8.0	-10.0	-8.0	-4.0	-4.0	-7.0
#2	6.0	8.0	11.0	7.0	11.0	12.0	12.0
#3	9.0	13.0	14.0	8.0	14.0	14.0	13.0
#4	[illegible]	14.0	15.0	12.0	15.0	—	15.0
#5	15.0	15.0	[illegible]	14.0	15.0	[illegible]	14.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 19 Quality Variable [illegible]
Specimen No. 2C1T

Hole Manufacturing Conditions and Procedures: [illegible]

Spindle, rpm 80 Feed: [illegible]
Cutting Fluid: [illegible] Depth: (Ind. Reading) [illegible]

Hole #1

Surface Finish, AA 90-95
Protrusion, in. 219
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse .2015
Flush Gage Reading, in. 0
Capacitance Gage Reading 245
Exit Burr Height, in.

Bluing Pin Rollout

66%

Air Gage Readings (.0001 in.)

318/323

Axial Position	Angular Position 0°	45°	90°	180°	225°	270°	315°
Bottom #1	[illegible]	-7.0	-6.0	6.0	-5.0	-4.0	[illegible]
#2	8.0	11.0	[illegible]	8.0	10.0	12.0	[illegible]
#3	13.0	14.0	14.0	[illegible]	14.0	14.0	13.0
#4	13.0	15.0	15.0	[illegible]	13.0	15.0	[illegible]
#5	11.0	12.0	12.0	[illegible]	12.0	12.0	17.0

Hole #2

Surface Finish, AA 92-[illegible]
Protrusion, in. 230
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse [illegible]
Flush Gage Reading, in. -.0002
Capacitance Gage Reading 239
Exit Burr Height, in.

Bluing Pin Rollout

65%

Air Gage Readings (.0001 in.)

317/321

Axial Position	Angular Position 0°	45°	90°	180°	225°	270°	315°
Bottom #1	-7.0	-8.0	-7.0	[illegible]	-6.0	[illegible]	[illegible]
#2	8.0	[illegible]	10.0	7.0	11.0	13.[illegible]	9.0
#3	11.0	13.0	14.0	12.0	[illegible]	[illegible]	[illegible]
#4	14.0	14.0	15.0	13.0	[illegible]	13.[illegible]	[illegible]
#5	[illegible]	[illegible]	14.0	12.3	14.0	14.0	[illegible]

MANUFACTURING REPORT: TAPERED HOLES

Test Series 19 Quality Variable [illegible]
Specimen No. [illegible]

Hole Manufacturing Conditions and Procedures: REAM UNDER-SIZE [illegible]

Spindle, rpm 80 Feed: [illegible]
Cutting Fluid: DRY Depth: (Ind. Reading) 2.382

Hole #1

Surface Finish, AA 95
Protrusion, in. 220
Perpendicularity, .001 in./in.
Longitudinal .0005 Transverse .002
Flush Gage Reading, in. 0
Capacitance Gage Reading 232
Exit Burr Height, in.

Bluing Pin Rollout

60%

317/323

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-6.0	-6.0	-5.0	-9.0	4.0	-3.0	-5.0
#2	7.0	12.0	12.0	7.0	11.0	13.0	9.0
#3	12.0	14.0	14.0	7.0	14.0	16.0	13.0
#4	12.0	—	—	10.0	15.0	14.0	12.0
#5	16.0	16.0	14.0	14.0	12.0	14.0	14.0

Hole #2

Surface Finish, AA 105
Protrusion, in. 216
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse .003
Flush Gage Reading, in. 0
Capacitance Gage Reading 251
Exit Burr Height, in.

Bluing Pin Rollout

70%

317/323

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-7.0	-10.0	-7.0	-6.0	-8.0	-4.0	-5.0
#2	7.0	10.0	11.0	7.0	11.0	11.0	9.0
#3	8.0	14.0	14.0	10.0	14.0	14.0	12.0
#4	11.0	15.0	15.0	12.0	14.0	15.0	14.0
#5	13.0	14.0	14.0	12.0	14.0	14.0	12.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 19 Quality Variable SURFACE ROUGHNESS [illegible]
Specimen No. 305T [illegible]

Hole Manufacturing Conditions and Procedures: [illegible] USE [illegible] REAMER [illegible]

Spindle, rpm 80 Feed: [illegible]
Cutting Fluid: DRY Depth: (Ind. Reading) .380

Hole #1

Surface Finish, AA 95

Bluing Pin Rollout

Protrusion, in. .225
Perpendicularity, .001 in./in.
Longitudinal .0015 Transverse .002
Flush Gage Reading, in. 0
Capacitance Gage Reading 258
Exit Burr Height, in.

55%

Air Gage Readings (.0001 in.)
Angular Position

312
522

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-8.0	-9.0	-4.0	-5.0	[illegible]	-2.0	-5.0
#2	7.0	11.0	11.0	5.0	10.0	[illegible]	10.0
#3	11.0	14.0	14.0	16.0	12.0	15.0	14.0
#4	16.0	15.0	15.0	11.0	15.0	—	13.0
#5	13.0	13.0	15.0	15.0	13.0	14.0	15.0

Hole #2

Surface Finish, AA 105

Bluing Pin Rollout

Protrusion, in. .228
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse 0
Flush Gage Reading, in. 0
Capacitance Gage Reading 247
Exit Burr Height, in.

70%

Air Gage Readings (.0001 in.)
Angular Position

316
522

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-9.0	-6.0	-9.0	-8.0	-9.0	-8.0	-8.0
#2	5.0	8.0	10.0	7.0	10.0	10.0	5.0
#3	8.0	13.0	13.0	8.0	13.0	13.0	9.0
#4	[illegible]	13.0	15.0	[illegible]	15.0	12.0	12.0
#5	[illegible]	13.0	14.0	[illegible]	14.0	12.0	15.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 19 Quality Variable SURFACE ROUGHNESS - QUALITY MAX, INT. 125 RMS
Specimen No. 4B1B

Hole Manufacturing Conditions and Procedures: REAM UNDERSIZE REAMER 1.255, REAM [illegible] L.H. SO. REL [illegible] USE STRAIGHT FLUTE REAMER [illegible] 1.200 ± .006 IN TRANSVERSE [illegible]

Spindle, rpm 80 Feed: [illegible]
Cutting Fluid: DRY Depth: (Ind. Reading) .380

Hole #1

Surface Finish, AA 120
Protrusion, in. .220
Perpendicularity, .001 in./in.
Longitudinal .002 Transverse .002
Flush Gage Reading, in. 0
Capacitance Gage Reading 242
Exit Burr Height, in.

Bluing Pin Rollout

55%

318
324

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-10.0	-9.0	-9.0	-8.0	-5.0	-4.0	-7.0
#2	5.0	-10.0	11.0	6.0	9.0	12.0	11.0
#3	10.0	13.0	13.0	7.0	13.0	14.0	14.0
#4	12.0	13.0	15.0	8.0	13.0	15.0	15.0
#5	13.0	13.0	15.0	13.0	13.0	14.0	15.0

Hole #2

Surface Finish, AA 100-105
Protrusion, in. .214
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .0015
Flush Gage Reading, in. .001
Capacitance Gage Reading 262
Exit Burr Height, in.

Bluing Pin Rollout

65%

319
324

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-9.0	-8.0	-9.0	-7.0	-11.0	-8.0	-9.0
#2	6.0	9.0	10.0	5.0	8.0	[illegible]	5.0
#3	8.0	13.0	13.0	9.0	12.0	[illegible]	13.0
#4	10.0	15.0	14.0	12.5	13.0	14.0	13.0
#5	14.0	14.0	14.0	13.0	12.0	14.0	14.0

INSPECTION SHEETS FOR TEST SERIES 20/21 -

COMBINED VARIABLES, REVERSE DOGBONE SPECIMENS

R RATIO = 0.1

MANUFACTURING REPORT: TAPERED HOLES

Test Series 21 Quality Variable Surface Roughness 125 RMS
Specimen No. 4D1BC & 6C3BC

Hole Manufacturing Conditions and Procedures: Ream with Under-Size Ream & 1.255 Ream and L.H. Spiral Ream

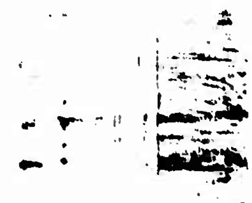
Spindle, rpm 80 Feed: .58 IPM
Cutting Fluid: DRY Depth: (Ind. Reading) 2450

Hole #1

Surface Finish, AA 95-100
Protrusion, in. .155
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse .0005
Flush Gage Reading, in. .002
Capacitance Gage Reading 322
Exit Burr Height, in.

90%

Bluing Pin Rollout



Air Gage Readings (.0001 in.)
Angular Position

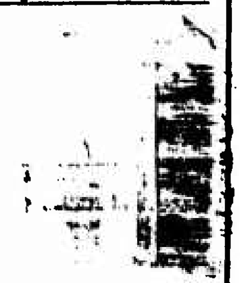
Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-5.0	-3.0	-4.0	-8.0	-11.0	-9.0	-10.0
#2	4.0	4.0	4.0	4.0	3.0	3.0	3.0
#3	3.0	3.0	3.0	3.0	2.0	4.0	4.0
#4	2.0	2.0	2.0	2.0	2.0	3.0	4.0
#5	3.0	2.0	2.0	4.0	4.0	5.0	5.0

Hole #2

Surface Finish, AA 95-110
Protrusion, in. .166
Perpendicularity, .001 in./in.
Longitudinal .0015 Transverse .001
Flush Gage Reading, in. 0
Capacitance Gage Reading 327
Exit Burr Height, in.

85%

Bluing Pin Rollout



Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-5.0	-3.0	-3.0	-9.0	-9.0	-8.0	-8.0
#2	4.0	6.0	5.0	3.0	3.0	4.0	3.0
#3	4.0	4.0	4.0	3.0	2.0	3.0	2.0
#4	2.0	1.0	2.0	3.0	3.0	2.0	0
#5	3.0	1.0	2.0	4.0	3.0	3.0	3.0

Figure 14 - Sample Manufacturing Report: Tapered Holes

MANUFACTURING REPORT: TAPERED HOLES

Test Series 21 Quality Variable ______
Specimen No. 2B2BCL3C2BC

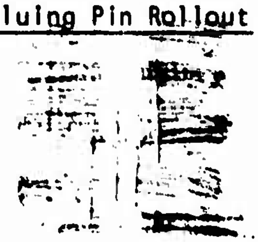
Hole Manufacturing Conditions and Procedures: Ream with Under-size Reamer 1.755. Ream [illegible]

Spindle, rpm 80 Feed: [illegible]
Cutting Fluid: DRY Depth: (Ind. Reading) [illegible]

Hole #1

Surface Finish, AA 110-130
Protrusion, in. 174
Perpendicularity, .001 in./in.
Longitudinal .0005 Transverse .002 75%
Flush Gage Reading, in. .001
Capacitance Gage Reading 275
Exit Burr Height, in. ______

Bluing Pin Rollout



Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-8.0	-3.0	-5.0	-7.0	-6.0	-8.0	-7.0
#2	6.0	7.0	5.0	4.0	4.0	5.0	7.0
#3	5.0	5.0	5.0	5.0	4.0	5.0	6.0
#4	3.0	4.0	3.0	3.0	1.0	3.0	5.0
#5	6.0	5.0	5.0	6.0	3.0	6.0	7.0

Hole #2

Surface Finish, AA 100-110
Protrusion, in. 173
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .0005 85%
Flush Gage Reading, in. 0
Capacitance Gage Reading 305
Exit Burr Height, in. ______

Bluing Pin Rollout

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-7.0	-9.0	-4.0	-8.0	-9.0	-10.0	-10.0
#2	3.0	1.0	4.0	3.0	3.0	2.0	1.0
#3	4.0	1.0	4.0	5.0	3.0	3.0	2.0
#4	4.0	0	2.0	1.0	2.0	2.0	2.0
#5	7.0	3.0	4.0	4.0	3.0	4.0	4.0

Figure 14 - Sample Manufacturing Report: Tapered Holes

MANUFACTURING REPORT: TAPERED HOLES

Test Series 21 Quality Variable SURFACE Roughness 125 RMS

Specimen No. LC3T L3C6TC

Hole Manufacturing Conditions and Procedures: Ream Undersize Reamer 1.755. Ream with MOD. L.H. Spiral Reamer

Spindle, rpm 80 Feed: .55 8. I.P.M.

Cutting Fluid: DRY Depth: (Ind. Reading) 2450

Hole #1

Surface Finish, AA 90-100

Protrusion, in. 162

Perpendicularity, .001 in./in.

Longitudinal .0 Transverse .002

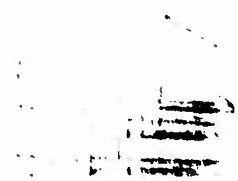
Flush Gage Reading, in. 0

Capacitance Gage Reading 308

Exit Burr Height, in.

96%

Bluing Pin Rollout



Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-2.0	-3.0	-5.0	-7.0	-10.0	-12.0	[illegible]
#2	4.0	3.0	4.0	2.0	3.0	2.0	3.0
#3	2.0	2.0	3.0	4.0	3.0	3.0	3.0
#4	1.0	0	0	4.0	4.0	4.0	3.0
#5	2.0	1.0	2.0	6.0	5.0	5.0	4.0

Hole #2

Surface Finish, AA 110-125

Protrusion, in. 166

Perpendicularity, .001 in./in.

Longitudinal 0 Transverse 0

Flush Gage Reading, in. .002

Capacitance Gage Reading 330

Exit Burr Height, in.

85%

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-8.0	-7.0	-6.0	-9.0	-12.0	-10.0	-10.0
#2	3.0	4.0	4.0	4.0	2.0	2.0	2.0
#3	4.0	2.0	2.0	3.0	4.0	4.0	3.0
#4	2.0	0	1.0	2.0	3.0	2.0	2.0
#5	2.0	1.0	1.0	4.0	4.0	4.0	2.0

Figure 14 - Sample Manufacturing Report: Tapered Holes

MANUFACTURING REPORT: TAPERED HOLES

Test Series 21 Quality Variable Surface Roughness 125 RHR
Specimen No. 3C3BCL 6B3BC

Hole Manufacturing Conditions and Procedures: Ream with Under-Size Reamer 1.755 Ream MOD. L.H. SP. [illegible]

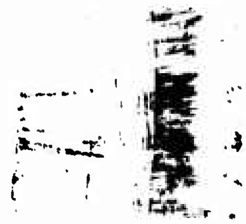
Spindle, rpm 80 Feed: [illegible]
Cutting Fluid: DRY Depth: (Ind. Reading) 2450

Hole #1

Surface Finish, AA 90-110
Protrusion, in. 173
Perpendicularity, .001 in./in.
Longitudinal .0015 Transverse .001
Flush Gage Reading, in. 0
Capacitance Gage Reading 320
Exit Burr Height, in.

80%

Bluing Pin Rollout



Air Gage Readings (.0001 in.)
Angular Position

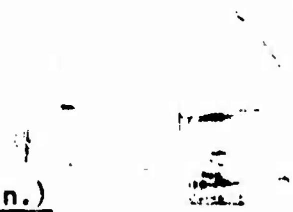
Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-8.0	-5.0	-6.0	-7.0	-12.0	-13.0	-10.0
#2	4.0	6.0	4.0	4.0	3.0	2.0	2.0
#3	3.0	3.0	2.0	4.0	3.0	2.0	2.0
#4	2.0	2.0	2.0	3.0	3.0	3.0	2.0
#5	4.0	2.0	5.0	5.0	5.0	5.0	4.0

Hole #2

Surface Finish, AA 95-105
Protrusion, in. 170
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse 0
Flush Gage Reading, in. .002
Capacitance Gage Reading 316
Exit Burr Height, in.

90%

Bluing Pin Rollout



Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-5.0	-4.0	-5.0	-8.0	-8.0	-13.0	-5.0
#2	5.0	7.0	7.0	6.0	3.0	1.0	5.0
#3	2.0	3.0	5.0	4.0	4.0	2.0	3.0
#4	0	1.0	0	2.0	3.0	3.0	2.0
#5	1.0	2.0	2.0	5.0	6.0	13.0	3.0

Figure 14 - Sample Manufacturing Report: Tapered Holes

MANUFACTURING REPORT: TAPERED HOLES

Test Series 21 Quality Variable Surface Roughness 125 RMS
Specimen No. 3C3BC & 4L3TC

Hole Manufacturing Conditions and Procedures: Ream with under-size reamer 1.255. Ream mod. L.H. spiral reamer

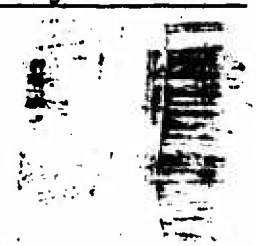
Spindle, rpm 80 Feed: 55 I.P.M.
Cutting Fluid: DRY Depth: (Ind. Reading) .2450

Hole #1

Surface Finish, AA 90-100
Protrusion, in. 181
Perpendicularity, .001 in./in.
Longitudinal .0005 Transverse .001
Flush Gage Reading, in. 0
Capacitance Gage Reading 328
Exit Burr Height, in.

85%

Bluing Pin Rollout



Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-6.0	-8.0	-8.0	-8.0	-9.0	-11.0	-8.0
#2	4.0	3.0	3.0	3.0	3.0	2.0	3.0
#3	4.0	2.0	2.0	3.0	5.0	3.0	4.0
#4	4.0	4.0	4.0	3.0	5.0	2.0	3.0
#5	5.0	5.0	4.0	2.0	4.0	4.0	4.0

Hole #2

Surface Finish, AA 100-105
Protrusion, in. 182
Perpendicularity, .001 in./in.
Longitudinal .0015 Transverse .001
Flush Gage Reading, in. .002
Capacitance Gage Reading 300
Exit Burr Height, in.

80%

Bluing Pin Rollout

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-9.0	-6.0	-4.0	-7.0	-10.0	-11.0	-10.0
#2	2.0	5.0	4.0	3.0	2.0	2.0	2.0
#3	4.0	4.0	4.0	3.0	4.0	4.0	4.0
#4	2.0	2.0	2.0	4.0	4.0	3.0	2.0
#5	3.0	2.0	2.0	4.0	5.0	4.0	4.0

Figure 14 - Sample Manufacturing Report: Tapered Holes

MANUFACTURING REPORT: TAPERED HOLES

Test Series 21 Quality Variable SURFACE-ROUGHNESS
Specimen No. LC3BL2B5TC MIO. INT. 125 RMS

Hole Manufacturing Conditions and Procedures: REAM UNDERSIZE REAMER 1.75, REAM MOD. L.H. SPIRAL REAMER

Spindle, rpm 80
Cutting Fluid: DRY
Feed: S.B.T.P.M.
Depth: (Ind. Reading) 2.446

Hole #1

Surface Finish, AA 105
Protrusion, in. 171
Perpendicularity, .001 in./in.
Longitudinal .0015 Transverse 0
Flush Gage Reading, in. -.001
Capacitance Gage Reading 310
Exit Burr Height, in.

Bluing Pin Rollout

75%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-14.0	-15.0	-15.0	-15.0	-14.0	-15.0	-13.0
#2	3.0	3.0	3.0	2.0	1.0	2.0	2.0
#3	5.0	4.0	4.0	3.0	3.0	3.0	4.0
#4	5.0	4.0	4.0	3.0	3.0	3.0	4.0
#5	5.0	4.0	4.0	2.0	3.0	4.0	4.0

Hole #2

Surface Finish, AA 90
Protrusion, in. 172
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .0005
Flush Gage Reading, in. 0
Capacitance Gage Reading 298
Exit Burr Height, in.

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-13.0	-15.0	-14.0	—	-14.0	-14.0	-14.0
#2	3.0	2.0	3.0	1.0	3.0	3.0	3.0
#3	5.0	4.0	4.0	2.0	4.0	4.0	4.0
#4	4.0	3.0	4.0	3.0	4.0	4.0	4.0
#5	4.0	4.0	4.0	3.0	3.0	4.0	4.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 21 Quality Variable SURFACE ROUGHNESS [illegible]

Specimen No. 3CUTC L31STC [illegible]

Hole Manufacturing Conditions and Procedures: REAM UNDERSIZE [illegible]

Spindle, rpm 80 Feed: [illegible]

Cutting Fluid: DRY Depth: (Ind. Reading) 2.44

Hole #1

Surface Finish, AA 110 115

Protrusion, in. 172

Perpendicularity, .001 in./in.

Longitudinal 0 Transverse .001

Flush Gage Reading, in. 0

Capacitance Gage Reading 323

Exit Burr Height, in.

Bluing Pin Rollout

80%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-14.0	-14.0	-14.0	-15.0	-14.0	-14.0	-15.0
#2	2.0	3.0	3.0	3.0	2.0	2.0	2.0
#3	4.0	4.0	4.0	4.0	4.0	4.0	4.0
#4	4.0	4.0	3.0	3.0	3.0	3.0	3.0
#5	4.0	4.0	3.0	3.0	3.0	2.0	3.0

Hole #2

Surface Finish, AA 110-115

Protrusion, in. 137

Perpendicularity, .001 in./in.

Longitudinal .002 Transverse 0

Flush Gage Reading, in. 0

Capacitance Gage Reading 176

Exit Burr Height, in.

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-14.0	-13.0	-12.0	-14.0	-15.0	-15.0	15.0
#2	3.0	3.0	4.0	3.0	2.0	2.0	3.0
#3	5.0	5.0	5.0	4.0	3.0	4.0	2.0
#4	5.0	5.0	5.0	5.0	3.0	3.0	4.0
#5	4.0	5.0	5.0	4.0	3.5	3.0	5.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 21 Quality Variable SURFACE ROUGHNESS
Specimen No. L03TC & L2C5TC

Hole Manufacturing Conditions and Procedures: REAM UNDER SIZE [illegible] EX 1755. REAM [illegible] L.H. SPIRAL REAMER

Spindle, rpm 80 Feed: [illegible]
Cutting Fluid: DRY Depth: (Ind. Reading) [illegible]

Hole #1

Surface Finish, AA 105 Bluing Pin Rollout
Protrusion, in. 163
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse .0015
Flush Gage Reading, in. 0
Capacitance Gage Reading 310
Exit Burr Height, in.

75%

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-13.0	-14.0	-15.0	-14.0	-15.0	-14.0	-14.0
#2	3.0	3.0	2.0	2.0	2.0	3.0	2.0
#3	5.0	5.0	5.0	5.0	4.0	5.0	5.0
#4	5.0	5.0	5.0	4.0	3.0	4.0	4.0
#5	4.0	4.0	4.0	4.0	4.0	4.0	5.0

Hole #2

Surface Finish, AA 100 Bluing Pin Rollout
Protrusion, in. 168
Perpendicularity, .001 in./in.
Longitudinal .0005 Transverse 0
Flush Gage Reading, in. -.002
Capacitance Gage Reading 297
Exit Burr Height, in.

75%

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-15.0	—	—	—	-15.0	—	-15.0
#2	3.0	3.0	3.0	4.0	3.0	3.0	3.0
#3	4.0	4.0	4.0	4.0	4.0	4.0	3.0
#4	4.0	3.0	4.0	3.0	4.0	4.0	3.0
#5	3.0	5.0	4.0	4.0	4.0	4.0	3.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 21 Quality Variable SURFACE ROUGHNESS [illegible]
Specimen No. 3B2TC & 3C6B6 [illegible] 125 [illegible]

Hole Manufacturing Conditions and Procedures: REAM UNDER SIZE REAMER 1.755, [illegible] REAMER

Spindle, rpm 80 Feed: [illegible]
Cutting Fluid: DRY Depth: (Ind. Reading) [illegible]

Hole #1

Surface Finish, AA 115

Protrusion, in. 170

Perpendicularity, .001 in./in.

Longitudinal .001 Transverse .0015

Flush Gage Reading, in. 0

Capacitance Gage Reading 290

Exit Burr Height, in.

Bluing Pin Rollout

75%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-9.0	-10.0	-9.0	-10.0	-10.0	-10.0	-9.0
#2	4.0	3.0	3.0	2.0	2.0	3.0	5.0
#3	5.0	4.0	5.0	4.0	3.0	4.0	5.0
#4	5.0	4.0	4.0	5.0	3.0	4.0	4.0
#5	5.0	6.0	6.0	6.0	5.0	6.0	6.0

Hole #2

Surface Finish, AA 90-100

Protrusion, in. 175

Perpendicularity, .001 in./in.

Longitudinal .001 Transverse 0

Flush Gage Reading, in. 0

Capacitance Gage Reading 298

Exit Burr Height, in.

Bluing Pin Rollout

75%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-10.0	-10.0	-11.0	-10.0	-11.0	-9.0	-9.0
#2	3.0	3.0	3.0	5.0	3.0	4.0	4.0
#3	4.0	5.0	5.0	4.0	4.0	5.0	5.0
#4	5.0	3.0	3.0	3.0	4.0	5.0	5.0
#5	5.0	6.0	6.0	5.0	5.0	6.0	7.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 21 Quality Variable SURFACE - ROUGHNESS
Specimen No. 3E2B L 6B4+ MID. INT. 125 RMS

Hole Manufacturing Conditions and Procedures: REAM UNDER SIZE REAM .1955. REAM MAN. L.H. SPIRAL REAMER.

Spindle, rpm 80 Feed: 5 REAM.
Cutting Fluid: DRY Depth: (Ind. Reading) 2.440

Hole #1

Surface Finish, AA 100
Protrusion, in. 178
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse 0
Flush Gage Reading, in. 0
Capacitance Gage Reading 353
Exit Burr Height, in.

90%

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-13.0	-15.0	-15.0	-14.0	-14.0	—	-15.0
#2	2.0	2.0	3.0	3.0	2.0	2.0	3.0
#3	2.0	4.0	4.0	4.0	4.0	3.0	4.0
#4	2.0	3.0	4.0	4.0	3.0	3.0	3.0
#5	4.0	4.0	4.0	5.0	3.0	3.0	3.0

Hole #2

Surface Finish, AA 110
Protrusion, in. 176
Perpendicularity, .001 in./in.
Longitudinal .0005 Transverse .001
Flush Gage Reading, in. .001
Capacitance Gage Reading 301
Exit Burr Height, in.

75%

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-14.0	-13.0	-15.0	-15.0	-15.0	-14.0	-14.0
#2	3.0	4.0	2.0	2.0	3.0	3.0	3.0
#3	5.0	5.0	5.0	5.0	4.0	4.0	4.0
#4	5.0	5.0	4.0	3.0	4.0	4.0	4.0
#5	4.0	6.0	4.0	5.0	5.0	4.0	4.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 21 Quality Variable Surface-Roughness Scratch
Specimen No. 2AGTC-4F6BC M.D.-INT. 125RMS

Hole Manufacturing Conditions and Procedures: Ream with Undersize Reamer 1.755 Ream and 6th Spiral Reamer Use Rotary tool Set .005 & Runout For [illegible]
Spindle, rpm 80 Feed: 55 8 IPM
Cutting Fluid: DRY Depth: (Ind. Reading) 2.450

Hole #1

Surface Finish, AA 95
Protrusion, in. 170
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse 0
Flush Gage Reading, in. .001
Capacitance Gage Reading 235
Exit Burr Height, in.

65%

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-8.0	-10.0	-15.0	-7.0	-6.0	-11.0	-9.0
#2	6.0	5.0	2.0	5.0	6.0	4.0	5.0
#3	7.0	6.0	4.0	7.0	6.0	5.0	7.0
#4	8.0	7.0	5.0	8.0	7.0	4.0	7.0
#5	10.0	11.0	10.0	10.0	10.0	6.0	10.0

Hole #2

Surface Finish, AA 100-110
Protrusion, in. 188
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse 0
Flush Gage Reading, in. .001
Capacitance Gage Reading 238
Exit Burr Height, in.

75%

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-7.0	-6.0	-8.0	-6.0	-5.0	-9.0	-11.0
#2	6.0	5.0	3.0	4.0	2.0	4.0	5.0
#3	7.0	4.0	4.0	6.0	2.0	6.0	6.0
#4	9.0	8.0	5.0	6.0	8.0	5.0	5.0
#5	12.0	12.0	12.0	12.0	12.0	10.0	8.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 21 Quality Variable SURFACE-ROUGHNESS-SCRATCH
Specimen No. 6B2B-6D6T AT.'D-INT. 125 RMS

Hole Manufacturing Conditions and Procedures: Ream with undersize Reamer 1.755. Ream Mod. L.H. Spiral Reamer Use Boring Tool set .005 & pull out for scratch

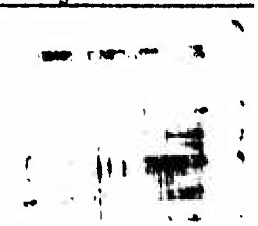
Spindle, rpm 80 Feed: .35 8 I.P.M.
Cutting Fluid: DRY Depth: (Ind. Reading) 2.450

Hole #1

Surface Finish, AA 95-105
Protrusion, in. .174
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse .0005
Flush Gage Reading, in. .001
Capacitance Gage Reading 231
Exit Burr Height, in.

70%

Bluing Pin Rollout



Air Gage Readings (.0001 in.)
Angular Position

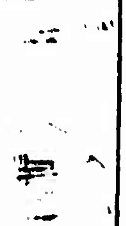
Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-9.0	-10.0	-11.0	-10.0	-9.0	-9.0	-8.0
#2	5.0	5.0	4.0	7.0	7.0	6.0	5.0
#3	7.0	7.0	6.0	5.0	6.0	5.0	7.0
#4	8.0	7.0	5.0	4.0	9.0	5.0	7.0
#5	11.0	11.0	9.0	7.0	8.0	6.0	9.0

Hole #2

Surface Finish, AA 110-120
Protrusion, in. .188
Perpendicularity, .001 in./in.
Longitudinal .0015 Transverse .001
Flush Gage Reading, in. 0
Capacitance Gage Reading 251
Exit Burr Height, in.

70%

Bluing Pin Rollout



Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-6.0	-8.0	-9.0	-8.0	-6.0	-9.0	-9.0
#2	6.0	4.0	3.0	5.0	5.0	5.0	5.0
#3	7.0	6.0	4.0	7.0	7.0	6.0	6.0
#4	7.0	6.0	4.0	8.0	8.0	6.0	6.0
#5	12.0	12.0	12.0	11.0	12.0	12.0	12.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 21 Quality Variable SURFACE ROUGHNESS - SCRATCH
Specimen No. CCSTC-21-?C MID-INT. 125 RMS

Hole Manufacturing Conditions and Procedures: REAM WITH UNDERSIZE REAMER 1.255 REAM MOD L.H. SPIRAL REAMER USE BURING TOOL SET ... LAND OUT FOR SCRATCH

Spindle, rpm 80 Feed: ...
Cutting Fluid: DRY Depth: (Ind. Reading) 2.450

Hole #1

Surface Finish, AA 100-105
Protrusion, in. 188
Perpendicularity, .001 in./in.
Longitudinal .0015 Transverse 0
Flush Gage Reading, in. .001
Capacitance Gage Reading 224
Exit Burr Height, in.

75%

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-6.0	-8.0	-11.0	-9.0	-5.0	-8.0	-7.0
#2	5.0	5.0	4.0	5.0	7.0	5.0	5.0
#3	6.0	7.0	6.0	7.0	8.0	7.0	7.0
#4	7.0	8.0	7.0	8.0	8.0	7.0	9.0
#5	12.0	12.0	12.0	13.0	12.0	9.0	13.0

Hole #2

Surface Finish, AA 95
Protrusion, in. 179
Perpendicularity, .001 in./in.
Longitudinal .0015 Transverse .0015
Flush Gage Reading, in. .002
Capacitance Gage Reading 227
Exit Burr Height, in.

85%

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-5.0	-8.0	-8.0	-8.0	-5.0	-8.0	-5.0
#2	7.0	6.0	5.0	5.0	6.0	7.0	6.0
#3	10.0	8.0	7.0	5.0	8.0	7.0	7.0
#4	11.0	9.0	7.0	12.0	8.0	7.0	[illegible]
#5	12.0	12.0	12.0	13.0	11.0	14.0	10.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 21 Quality Variable SURFACE ROUGHNESS - SCRATCH
Specimen No. 206BC-6BST MID INT. 125 RMS

Hole Manufacturing Conditions and Procedures: REAM WITH UNDER SIZE REAMER .235 REAM MOD. B.H. SPIRAL REAMER USE BORING TOOL SET .005 & PULL OUT FOR SCRATCH

Spindle, rpm 80 Feed: 55 & RPM
Cutting Fluid: DRY Depth: (Ind. Reading) 2.450

Hole #1

Surface Finish, AA 110
Protrusion, in. 174
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .001
Flush Gage Reading, in. .001
Capacitance Gage Reading 245
Exit Burr Height, in.

Bluing Pin Rollout

65%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-9.0	-9.0	-9.0	[illegible]	-8.0	-11.0	-11.0
#2	5.0	4.0	4.0	6.0	5.0	4.0	5.0
#3	7.0	3.0	4.0	[illegible]	8.0	7.0	7.0
#4	8.0	2.0	3.0	[illegible]	[illegible]	6.0	7.0
#5	10.0	8.0	7.0	7.0	[illegible]	6.0	[illegible]

Hole #2

Surface Finish, AA 125
Protrusion, in. 186
Perpendicularity, .001 in./in.
Longitudinal .0015 Transverse .002
Flush Gage Reading, in. 0
Capacitance Gage Reading 350
Exit Burr Height, in.

Bluing Pin Rollout

85%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-7.0	-9.0	-10.0	-7.0	-5.0	-6.0	[illegible]
#2	4.0	3.0	[illegible]	4.0	5.0	5.0	4.0
#3	6.0	6.0	3.0	5.0	7.0	7.0	5.0
#4	8.0	6.0	5.0	7.0	7.0	[illegible]	4.0
#5	10.0	[illegible]	9.0	12.0	9.0	9.0	6.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 21 Quality Variable Surface Roughness Scratch [illegible] 125 RMS
Specimen No. 2A3LC-6C1B

Hole Manufacturing Conditions and Procedures: [illegible]

Spindle, rpm [illegible] Feed: [illegible]
Cutting Fluid: DRY Depth: (Ind. Reading) [illegible]

Hole #1

Surface Finish, AA 120-125
Protrusion, in. 185
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .0015 75%
Flush Gage Reading, in. .0
Capacitance Gage Reading 220
Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-4.0	-4.0	-7.0	-7.0	-2.0	-4.0	-6.0
#2	6.0	6.0	4.0	2.0	6.0	5.0	4.0
#3	8.0	8.0	6.0	3.0	6.0	5.0	5.0
#4	9.0	9.0	8.0	4.0	7.0	5.0	5.0
#5	15.0	13.0	13.0	13.0	11.0	12.0	9.0

Hole #2

Surface Finish, AA 100
Protrusion, in. 185
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse .0005 75%
Flush Gage Reading, in. .001
Capacitance Gage Reading 228
Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-11.0	-7.0	-8.0	-3.0	-4.0	-5.0	-7.0
#2	4.0	2.0	3.0	6.0	7.0	7.0	4.0
#3	5.0	6.0	6.0	7.0	8.0	8.0	6.0
#4	6.0	6.0	5.0	6.0	9.0	9.0	7.0
#5	12.0	12.0	12.0	11.0	10.0	12.0	12.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 21 Quality Variable SURFACE ROUGHNESS- SCRATCH
Specimen No. 306TC & 403TC MID. INT. 125 RMS

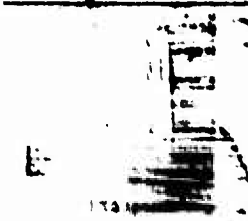
Hole Manufacturing Conditions and Procedures: REAM: UNDER SIZE REAMER 1255 REAM MOD. L.M. SPIRAL REAMER USE NEW CUT TOOL SET .005 & PULL OUT FOR SCRATCH

Spindle, rpm 50 Feed: 5 [illegible]
Cutting Fluid: DRY Depth: (Ind. Reading) 2.440

Hole #1

Surface Finish, AA 100
Protrusion, in. 184
Perpendicularity, .001 in./in.
Longitudinal .0005 Transverse .0025 85%
Flush Gage Reading, in. -.001
Capacitance Gage Reading 240
Exit Burr Height, in.

Bluing Pin Rollout



Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-12.0	-12.0	-13.0	-14.0	-12.0	-12.0	-13.0
#2	4.0	3.0	2.0	3.0	4.0	4.0	3.0
#3	6.0	5.0	5.0	5.0	5.0	4.0	5.0
#4	6.0	5.0	5.0	5.0	5.0	4.0	4.0
#5	7.0	6.0	6.0	7.0	6.0	5.0	5.0

Hole #2

Surface Finish, AA 100
Protrusion, in. 163
Perpendicularity, .001 in./in.
Longitudinal .0015 Transverse .0015 75%
Flush Gage Reading, in. -.002
Capacitance Gage Reading 241
Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-12.0	-13.0	-13.0	-13.0	-14.0	-8.0	-7.0
#2	4.0	4.0	3.0	3.0	3.0	3.0	4.0
#3	6.0	6.0	5.0	4.0	5.0	3.0	4.0
#4	6.0	5.0	5.0	4.0	4.0	3.0	4.0
#5	7.0	6.0	6.0	4.0	4.0	6.0	6.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 21 Quality Variable [illegible]
Specimen No. [illegible]

Hole Manufacturing Conditions and Procedures: [illegible]
Spindle, rpm 80 Feed: [illegible]
Cutting Fluid: DRY Depth: (Ind. Reading) [illegible]

Hole #1

Surface Finish, AA 100
Protrusion, in. 182
Perpendicularity, .001 in./in.
Longitudinal .0015 Transverse .001
Flush Gage Reading, in. 0
Capacitance Gage Reading 234
Exit Burr Height, in.

Bluing Pin Rollout
75%

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-14.0	-13.0	-12.0	[illegible]	-13.0	-12.0	-11.0
#2	3.0	3.0	3.0	3.0	3.0	3.0	3.0
#3	5.0	5.0	4.0	4.0	5.0	5.0	4.0
#4	5.0	5.0	4.0	4.0	4.0	5.0	3.0
#5	7.0	7.0	7.0	7.0	6.0	6.0	8.0

Hole #2

Surface Finish, AA 120
Protrusion, in. 177
Perpendicularity, .001 in./in.
Longitudinal .0005 Transverse .001
Flush Gage Reading, in. -.001
Capacitance Gage Reading 243
Exit Burr Height, in.

Bluing Pin Rollout
70%

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-11.0	-15.0	[illegible]	-13.0	-11.0	-13.0	-11.0
#2	3.0	2.0	2.0	3.0	4.0	3.0	3.0
#3	4.0	4.0	4.0	5.0	5.0	4.0	4.0
#4	[illegible]	4.0	4.0	5.0	5.0	4.0	4.0
#5	5.0	6.0	5.0	6.0	6.0	5.0	4.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 21 Quality Variable SURFACE [illegible] SCRATCH
Specimen No. 6[illegible]-6[illegible] [illegible] 125 [illegible]

Hole Manufacturing Conditions and Procedures: REAM UNDERSIZE
[illegible] REAM [illegible]
[illegible] PULLOUT FOR SCRATCH

Spindle, rpm 80 Feed: [illegible] IPR
Cutting Fluid: DRY Depth: (Ind. Reading) .444

Hole #1

Surface Finish, AA 100
Protrusion, in. 182
Perpendicularity, .001 in./in.
Longitudinal .002 Transverse .0015
Flush Gage Reading, in. 0
Capacitance Gage Reading 222
Exit Burr Height, in.

75%

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-10.0	-8.0	-9.0	-7.0	-10.0	-11.0	-13.0
#2	3.0	3.0	2.0	3.0	3.0	2.0	2.0
#3	5.0	4.0	4.0	4.0	4.0	4.0	4.0
#4	4.0	4.0	4.0	4.0	3.0	3.0	4.0
#5	7.0	5.0	7.0	7.0	7.0	5.0	5.0

Hole #2

Surface Finish, AA 110
Protrusion, in. 175
Perpendicularity, .001 in./in.
Longitudinal .002 Transverse .0015
Flush Gage Reading, in. -.001
Capacitance Gage Reading 221
Exit Burr Height, in.

85%

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-10.0	-10.0	-8.0	-7.0	-9.0	-11.0	-12.0
#2	1.0	1.0	3.0	3.0	4.0	2.0	1.0
#3	5.0	4.0	4.0	3.0	4.0	4.0	4.0
#4	5.0	4.0	4.0	2.0	4.0	4.0	4.0
#5	7.0	6.0	7.0	6.0	6.0	5.0	6.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 21 Quality Variable [illegible]

Specimen No. [illegible]

Hole Manufacturing Conditions and Procedures: [illegible]

Spindle, rpm 80 Feed: [illegible]

Cutting Fluid: Dry Depth: (Ind. Reading) .442

Hole #1

Surface Finish, AA [illegible] — Bluing Pin Rollout

Protrusion, in. .162

Perpendicularity, .001 in./in.

Longitudinal .0005 Transverse .0205

80%

Flush Gage Reading, in. 0

Capacitance Gage Reading 226

Exit Burr Height, in.

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-14.0	-13.0	-13.0	-13.0	-13.0	-12.0	-14.0
#2	2.0	3.0	4.0	3.0	3.0	2.0	3.0
#3	5.0	5.0	5.0	4.0	4.0	5.0	5.0
#4	5.0	5.0	5.0	3.0	4.0	4.0	4.0
#5	6.0	6.0	6.0	5.0	5.0	5.0	6.0

Hole #2

Surface Finish, AA 100 — Bluing Pin Rollout

Protrusion, in. 171

Perpendicularity, .001 in./in.

Longitudinal .0015 Transverse .0215

80%

Flush Gage Reading, in. .0[illegible]

Capacitance Gage Reading 235

Exit Burr Height, in.

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-13.0	14.0	-12.0	-11.0	-12.0	-13.0	-14.0
#2	3.0	2.0	2.0	3.0	4.0	4.0	3.0
#3	5.0	5.0	4.0	4.0	5.0	5.0	5.0
#4	5.0	4.0	3.0	4.0	5.0	5.0	5.0
#5	6.0	6.0	5.0	7.0	6.0	5.0	6.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 21 Quality Variable SURFACE [illegible] - SCRATCH
Specimen No. 202TCL2H3TC M.C. I [illegible] 125 RMS

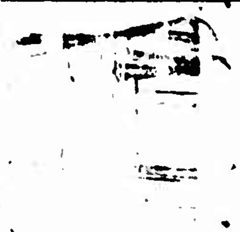
Hole Manufacturing Conditions and Procedures: REAM UNDERSIZE REAMER [illegible] REAM [illegible] L.H. SPIRAL REAMER [illegible] TOOL SET .005 [illegible] CUT FOR SCRATCH
Spindle, rpm 80 Feed: [illegible]
Cutting Fluid: DRY Depth: (Ind. Reading) 2.440

Hole #1

Surface Finish, AA 110
Protrusion, in. 175
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .0005
Flush Gage Reading, in. 0
Capacitance Gage Reading 232
Exit Burr Height, in. ____

75%

Bluing Pin Rollout



Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-13.0	-14.0	-13.0	-13.0	-12.0	-13.0	-13.0
#2	4.0	3.0	3.0	3.0	3.0	4.0	4.0
#3	5.0	5.0	4.0	5.0	4.0	5.0	5.0
#4	5.0	5.0	3.0	4.0	4.0	5.0	5.0
#5	6.0	6.0	6.0	6.0	6.0	6.0	6.0

Hole #2

Surface Finish, AA 95 100
Protrusion, in. 181
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse 0
Flush Gage Reading, in. .001
Capacitance Gage Reading 258
Exit Burr Height, in. ____

70%

Bluing Pin Rollout

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-13.0	-13.0	-13.0	-15.0	-13.0	-13.0	-11.0
#2	3.0	3.0	2.0	3.0	4.0	4.0	4.0
#3	5.0	5.0	5.0	4.0	5.0	4.0	5.0
#4	5.0	5.0	4.0	4.0	5.0	4.0	5.0
#5	6.0	5.0	6.0	5.0	6.0	5.0	5.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 21 Quality Variable Su[illegible] AT 0 INT. 125 [illegible]

Specimen No. [illegible]

Hole Manufacturing Conditions and Procedures: REAM WITH UNDER-SIZE REAMER 1.755 REF. MED. L.H. SPIRAL REE. [illegible] USE [illegible] L.H. SPIRAL REAMER [illegible] NO RPL1

Spindle, rpm 80 Feed: 8 IPM

Cutting Fluid: Dry Depth: (Ind. Reading) [illegible]

Hole #1

Surface Finish, AA 110-120

Protrusion, in. 175

Perpendicularity, .001 in./in.

Longitudinal .001 Transverse .001

Flush Gage Reading, in. 0

Capacitance Gage Reading 288

Exit Burr Height, in.

75%

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-9.0	-8.0	-10.0	-10.0	-9.0	-6.0	-10.0
#2	7.0	6.0	7.0	4.0	5.0	7.0	7.0
#3	7.0	7.0	7.0	4.0	5.0	7.0	7.0
#4	7.0	7.0	7.0	3.0	5.0	6.0	6.0
#5	8.0	8.0	7.0	4.0	6.0	7.0	7.0

Hole #2

Surface Finish, AA 110

Protrusion, in. 160

Perpendicularity, .001 in./in.

Longitudinal .0005 Transverse .0005

Flush Gage Reading, in. 0

Capacitance Gage Reading 280

Exit Burr Height, in.

70%

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-10.0	-8.0	-6.0	-11.0	-9.0	-8.0	-10.0
#2	6.0	6.0	7.0	5.0	7.0	8.0	5.0
#3	7.0	6.0	8.0	5.0	5.0	9.0	7.0
#4	9.0	5.0	6.0	4.0	7.0	8.0	7.0
#5	6.0	7.0	8.0	7.0	8.0	9.0	5.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 21 Quality Variable SURFACE-ROUGHNESS - [illegible]
Specimen No. [illegible] MIL-[illegible] 125 RMS

Hole Manufacturing Conditions and Procedures: REAM WITH UNDER-SIZE REAMER [illegible] REAM [illegible] L.H. SPIRAL REAMER USE MOD L.H. SPIRAL REAMER PUSH-IN [illegible]

Spindle, rpm 80 Feed: [illegible]
Cutting Fluid: DRY Depth: (Ind. Reading) 2.450

Hole #1

Surface Finish, AA 120
Protrusion, in. .168
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .001
Flush Gage Reading, in. .001
Capacitance Gage Reading 247
Exit Burr Height, in.

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-11.0	-8.0	-7.0	-10.0	-12.0	-9.0	-10.0
#2	3.0	5.0	9.0	4.0	3.0	5.0	5.0
#3	6.0	7.0	8.0	7.0	[illegible]	6.0	[illegible]
#4	5.0	7.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
#5	6.0	5.0	[illegible]	7.0	7.0	8.0	[illegible]

Hole #2

Surface Finish, AA 95-100
Protrusion, in. .174
Perpendicularity, .001 in./in.
Longitudinal .0 Transverse .0015
Flush Gage Reading, in. .001
Capacitance Gage Reading 312
Exit Burr Height, in.

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-9.0	-12.0	-10.0	-12.0	-9.0	-9.0	-11.0
#2	6.0	6.0	4.0	5.0	6.0	5.0	5.0
#3	4.0	2.0	5.0	4.0	5.0	3.0	5.0
#4	4.0	2.0	4.0	3.0	4.0	3.0	5.0
#5	5.0	3.0	6.0	5.0	5.0	4.0	5.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 21 Quality Variable [illegible]
Specimen No. 10381-316T [illegible]

Hole Manufacturing Conditions and Procedures: [illegible]

Spindle, rpm 80 Feed: [illegible]
Cutting Fluid: DRY Depth: (Ind. Reading) 1.450

Hole #1

Surface Finish, AA 95-100
Protrusion, in. 174
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .003
Flush Gage Reading, in. 0
Capacitance Gage Reading 274
Exit Burr Height, in.

Bluing Pin Rollout

80%

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-7.0	-11.0	-4.0	-1.0	-11.0	-10.6	-8.0
#2	5.0	5.0	7.0	4.0	4.0	6.0	6.0
#3	5.0	5.0	8.0	3.0	3.0	6.0	6.0
#4	5.0	6.0	6.0	1.0	1.0	6.0	6.0
#5	6.0	7.0	7.0	3.0	3.0	7.0	7.0

Hole #2

Surface Finish, AA 100
Protrusion, in. 168
Perpendicularity, .001 in./in.
Longitudinal .0005 Transverse 0
Flush Gage Reading, in. .002
Capacitance Gage Reading 290
Exit Burr Height, in.

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-10.0	-9.0	-8.0	-10.0	-11.0	-7.0	-10.0
#2	5.0	6.0	6.0	3.0	4.0	5.0	5.0
#3	5.0	6.0	7.0	3.0	4.0	5.0	7.0
#4	5.0	6.0	6.0	3.0	4.0	6.0	6.0
#5	6.0	7.0	7.0	4.0	3.0	6.0	7.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 21 Quality Variable Surface Roughness - Bifling
Specimen No. 3C1TC-6B13 Mid-Int. 125 RMS

Hole Manufacturing Conditions and Procedures: Ream with under-size reamer .1955 Ream Mod. L.H. Spiral Reamer Use Mod. L.H. Spiral Reamer push in 400-500 RPM.
Spindle, rpm 80 Feed: 53 IPM
Cutting Fluid: DRY Depth: (Ind. Reading) 2.450

Hole #1

Surface Finish, AA 100 — Bluing Pin Rollout
Protrusion, in. 165
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .0015
Flush Gage Reading, in. -.002 — 75%
Capacitance Gage Reading 268
Exit Burr Height, in.

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-8.0	-10.0	-7.0	-10.0	-9.0	-6.0	-6.0
#2	6.0	4.0	7.0	5.0	7.0	6.0	7.0
#3	7.0	6.0	5.0	5.0	7.0	7.0	7.0
#4	7.0	5.0	4.0	4.0	7.0	7.0	8.0
#5	7.0	6.0	4.0	5.0	7.0	7.0	8.0

Hole #2

Surface Finish, AA 100-105 — Bluing Pin Rollout
Protrusion, in. 163
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse .0025
Flush Gage Reading, in. 0 — 80%
Capacitance Gage Reading 297
Exit Burr Height, in.

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-10.0	-11.0	-10.0	-9.0	-11.0	-7.0	-10.0
#2	6.0	6.0	6.0	6.0	6.0	8.0	7.0
#3	6.0	6.0	7.0	6.0	6.0	7.0	6.0
#4	6.0	6.0	7.0	5.0	5.0	6.0	6.0
#5	8.0	7.0	8.0	5.0	5.0	7.0	7.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 21 Quality Variable [illegible]
Specimen No. 40[illegible] 406[illegible] M.O. [illegible] 125 [illegible]

Hole Manufacturing Conditions and Procedures: [illegible]

Spindle, rpm 82
Cutting Fluid: DRY
Feed: [illegible]
Depth: (Ind. Reading) 2.45[illegible]

Hole #1

Surface Finish, AA 100-105
Protrusion, in. 174
Perpendicularity, .001 in./in.
Longitudinal .0 Transverse .0005
Flush Gage Reading, in. 0
Capacitance Gage Reading 292
Exit Burr Height, in.

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-8.0	-7.0	-8.0	-6.0	-8.0	-4.0	-7.0
#2	7.0	8.0	9.0	[illegible]	6.0	9.0	8.0
#3	8.0	8.0	8.0	7.0	6.0	8.0	[illegible]
#4	8.0	8.0	[illegible]	7.0	5.0	[illegible]	7.0
#5	10.0	10.0	10.0	6.0	7.0	[illegible]	10.[illegible]

Hole #2

Surface Finish, AA 125
Protrusion, in. 167
Perpendicularity, .001 in./in.
Longitudinal .0005 Transverse .0005
Flush Gage Reading, in. .001
Capacitance Gage Reading 297
Exit Burr Height, in.

Bluing Pin Rollout

85%

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-8.0	-8.0	-7.0	-9.0	-7.0	-5.0	-7.0
#2	6.0	6.0	8.0	6.0	8.0	8.0	[illegible]
#3	5.0	5.0	7.0	5.0	[illegible]	9.0	7.0
#4	3.0	3.0	5.0	6.0	8.0	10.0	6.0
#5	5.0	5.0	6.0	9.0	10.[illegible]	10.0	8.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 21 Quality Variable [illegible]
Specimen No. 6C3TCL3D4BC [illegible]

Hole Manufacturing Conditions and Procedures: [illegible]

Spindle, rpm [illegible] Feed: [illegible]
Cutting Fluid: [illegible] Depth: (Ind. Reading) 2.440

Hole #1

Surface Finish, AA 100
Protrusion, in. 176
Perpendicularity, .001 in./in.
Longitudinal .0005 Transverse .001
Flush Gage Reading, in. 0
Capacitance Gage Reading 293
Exit Burr Height, in.

75%

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	180°	225°	270°	315°
Bottom #1	-12.0	-11.0	-13.0	-13.0	[illegible]	-11.0	[illegible]
#2	4.0	4.0	4.0	[illegible]	3.0	4.0	4.0
#3	5.0	5.0	6.0	5.0	4.0	6.0	[illegible]
#4	5.0	5.0	5.0	4.0	3.0	[illegible]	5.0
#5	5.0	5.0	5.0	4.0	3.0	4.0	[illegible]

Hole #2

Surface Finish, AA 110
Protrusion, in. 170
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse .0005
Flush Gage Reading, in. .001
Capacitance Gage Reading 265
Exit Burr Height, in.

85%

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	180°	225°	270°	315°
Bottom #1	-12.0	-9.0	-12.0	-8.0	-11.0	-12.0	-11.0
#2	4.0	3.0	4.0	3.0	3.0	4.0	4.0
#3	5.0	5.0	6.0	4.0	4.0	5.0	5.0
#4	5.0	5.0	4.0	4.0	4.0	4.0	4.0
#5	5.0	5.0	4.0	4.0	4.0	4.0	4.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 21 Quality Variable [illegible]
Specimen No. [illegible] 13B5B2 [illegible]

Hole Manufacturing Conditions and Procedures: REAM UNDER SIZE [illegible]

Spindle, rpm 80 Feed: [illegible]
Cutting Fluid: DRY Depth: (Ind. Reading) [illegible]

Hole #1

Surface Finish, AA 95-[illegible]
Protrusion, in. 160
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse 0
Flush Gage Reading, in. 0
Capacitance Gage Reading 295
Exit Burr Height, in.

Bluing Pin Rollout

75%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	[illegible]	-15.0	-14.0	-15.0	[illegible]	-10.[illegible]	-13.0
#2	2.0	[illegible]	3.0	3.0	3.0	3.0	3.0
#3	3.0	5.0	[illegible]	4.0	4.0	4.0	5.[illegible]
#4	[illegible]	4.0	5.0	4.0	3.0	4.0	5.0
#5	[illegible]	4.0	4.0	4.0	3.0	3.0	4.0

Hole #2

Surface Finish, AA 90-[illegible]
Protrusion, in. 175
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .001
Flush Gage Reading, in. .001
Capacitance Gage Reading 305
Exit Burr Height, in.

Bluing Pin Rollout

80%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-12.0	-13.0	-13.0	-15.0	-13.0	-12.0	-12.0
#2	3.0	3.0	4.0	[illegible]	3.0	4.0	4.0
#3	5.0	5.0	6.0	4.0	4.0	5.0	5.0
#4	4.0	5.0	6.0	3.0	4.0	5.0	5.0
#5	4.0	4.0	5.0	4.0	5.0	[illegible]	4.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 21 Quality Variable Surface-Roughness-[illegible]
Specimen No. [illegible] MID-INT. 125 [illegible]

Hole Manufacturing Conditions and Procedures: REAM UNDER SIZE REAMER .1755 REAM [illegible] L.H. SP. [illegible] REAMER. USE [illegible] L.H. SP. [illegible] REAM [illegible]

Spindle, rpm 80 Feed: [illegible]
Cutting Fluid: DRY Depth: (Ind. Reading) .2440

Hole #1

Surface Finish, AA 115-[illegible]
Protrusion, in. .173
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse 0
Flush Gage Reading, in. .001
Capacitance Gage Reading 304
Exit Burr Height, in.

Bluing Pin Rollout

80%

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-13.0	-12.0	-14.0	-14.0	-14.0	-13.0	-14.0
#2	4.0	3.0	3.0	2.0	2.0	4.0	3.0
#3	4.0	5.0	5.0	4.0	4.0	5.0	4.0
#4	4.0	4.0	6.0	4.0	3.0	[illegible]	3.0
#5	4.0	4.0	5.0	4.0	4.0	4.0	4.0

Hole #2

Surface Finish, AA 115-120
Protrusion, in. .160
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse .0015
Flush Gage Reading, in. .001
Capacitance Gage Reading 302
Exit Burr Height, in.

Bluing Pin Rollout

85%

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-14.0	—	-14.0	-14.0	—	-10.0	-14.0
#2	4.0	4.0	4.0	4.0	3.0	5.0	4.0
#3	5.0	5.0	6.0	4.0	4.0	5.0	4.0
#4	4.0	4.0	5.0	4.0	3.0	3.0	3.0
#5	3.0	3.0	[illegible]	4.0	3.0	3.0	3.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 21 Quality Variable SURFACE ROUGHNESS [illegible] [illegible] 115RMS
Specimen No. [illegible] C

Hole Manufacturing Conditions and Procedures: [illegible] UNDER [illegible] [illegible] 1.755 REAM AND L.H SPIRAL [illegible] USE [illegible] SPIRAL REAM [illegible]

Spindle, rpm [illegible]   Feed: [illegible] IPM
Cutting Fluid: DRY   Depth: (Ind. Reading) [illegible]

Hole #1

Surface Finish, AA 90
Protrusion, in. 175
Perpendicularity, .001 in./in.
Longitudinal 10-1 Transverse [illegible]
Flush Gage Reading, in. 0
Capacitance Gage Reading 293
Exit Burr Height, in.

75%

Bluing Pin Rollout

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-13.0	-12.0	-12.0	-14.0	-14.0	-12.0	-11.0
#2	3.0	3.0	4.0	2.0	2.0	3.0	3.0
#3	4.0	4.0	4.0	4.0	3.0	4.0	4.0
#4	3.0	3.0	4.0	3.0	3.0	3.0	3.0
#5	4.0	4.0	4.0	3.0	3.0	3.0	4.0

Hole #2

Surface Finish, AA 100
Protrusion, in. 158
Perpendicularity, .001 in./in.
Longitudinal .0015 Transverse .002
Flush Gage Reading, in. 0
Capacitance Gage Reading 278
Exit Burr Height, in.

75%

Bluing Pin Rollout

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-13.0	-13.0	-14.0	-14.0	-14.0	-13.0	-14.0
#2	4.0	4.0	4.0	2.0	3.0	4.0	4.0
#3	4.0	4.0	5.0	5.0	5.0	4.0	4.0
#4	3.0	4.0	5.0	5.0	3.0	3.0	4.0
#5	3.0	5.0	5.0	4.0	4.0	4.0	4.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 21 Quality Variable SURFACE ROUGHNESS [illegible]
Specimen No. 3E6B-6C4T MIN. INT. 125 [illegible]

Hole Manufacturing Conditions and Procedures: REAM UNDER SIZE REAM [illegible] REAM [illegible] L.H. SPIRAL REAMER USE [illegible] L.H. SPIRAL REAMER PUSH [illegible] NO [illegible]

Spindle, rpm 80 Feed: [illegible]
Cutting Fluid: DRY Depth: (Ind. Reading) .440

Hole #1

Surface Finish, AA 100 Bluing Pin Rollout
Protrusion, in. .175
Perpendicularity, .001 in./in.
Longitudinal .0005 Transverse .0005
Flush Gage Reading, in. .001 85%
Capacitance Gage Reading 292
Exit Burr Height, in.

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-11.0	-12.0	-12.0	-12.0	-12.0	-13.0	-12.0
#2	2.0	2.0	4.0	4.0	4.0	3.0	3.0
#3	4.0	4.0	4.0	5.0	4.0	4.0	4.0
#4	3.0	3.0	3.0	5.0	4.0	4.0	3.0
#5	4.0	3.0	3.0	5.0	5.0	5.0	3.0

Hole #2

Surface Finish, AA 100 Bluing Pin Rollout
Protrusion, in. .163
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .001
Flush Gage Reading, in. .001 70%
Capacitance Gage Reading 300
Exit Burr Height, in.

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-14.0	-13.0	-12.0	-13.0	-11.0	-13.0	-12.0
#2	2.0	2.0	3.0	3.0	3.0	3.0	3.0
#3	4.0	4.0	5.0	4.0	4.0	4.0	5.0
#4	4.0	3.0	3.0	4.0	4.0	40	40
#5	4.0	3.0	3.0	40	40	40	40

MANUFACTURING REPORT: TAPERED HOLES

Test Series 21 Quality Variable [illegible] - QUALITY

Specimen No. 3EGBL-6B3+C [illegible]

Hole Manufacturing Conditions and Procedures: [illegible]

Spindle, rpm 80 Feed: [illegible]

Cutting Fluid: DRY Depth: (Ind. Reading) 2.442

Hole #1

Surface Finish, AA 120

Protrusion, in. 164

Perpendicularity, .001 in./in.

Longitudinal .0005 Transverse 0

Flush Gage Reading, in. -.001

Capacitance Gage Reading 234

Exit Burr Height, in.

Bluing Pin Rollout

60%

325

319

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-7.0	-7.0	-7.0	-8.0	-7.0	-9.0	-9.0
#2	8.0	9.0	11.0	6.0	8.0	11.0	8.0
#3	9.0	13.0	13.0	5.0	12.0	14.0	12.0
#4	11.0	15.0	15.0	4.0	13.0	15.0	14.0
#5	11.0	13.0	13.0	11.0	[illegible]	13.0	11.0

Hole #2

Surface Finish, AA 100-105

Protrusion, in. 160

Perpendicularity, .001 in./in.

Longitudinal .001 Transverse .0015

Flush Gage Reading, in. -.001

Capacitance Gage Reading 231

Exit Burr Height, in.

Bluing Pin Rollout

75%

325

319

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-7.0	-7.0	-7.0	-9.0	-8.0	[illegible]	-10.0
#2	6.0	5.0	11.0	6.0	11.0	10.0	6.0
#3	8.0	13.0	14.0	6.0	14.0	13.0	10.0
#4	10.0	13.0	15.0	7.0	15.0	15.0	13.0
#5	12.0	11.0	13.0	12.0	[illegible]	10.0	12.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 21 Quality Variable SURFACE ROUGHNESS-QUALITY
Specimen No. 3E2BC-4B6TC MIN. INT. 125 RMS

Hole Manufacturing Conditions and Procedures: REAM UNDER-SIZE REAMER 1.755 REAM MOD. L.H. SPIRAL REAMER USE STRAIGHT FLUTE REAMER PLUNGE 1.703 ±.006 IN TRANSVERSE DIR

Spindle, rpm 80
Cutting Fluid: DRY
Feed: [illegible]
Depth: (Ind. Reading) 2.440

Hole #1

Surface Finish, AA 125
Protrusion, in. 177
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .0015
Flush Gage Reading, in. -.001
Capacitance Gage Reading 220
Exit Burr Height, in.

Bluing Pin Rollout

70%

319/325

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-6.0	-5.0	-7.0	-8.0	-5.0	-8.0	-6.0
#2	7.0	11.0	11.0	5.0	7.0	10.0	8.0
#3	8.0	14.0	14.0	4.0	13.0	13.0	11.0
#4	12.0	14.0	14.0	8.0	14.0	13.0	14.0
#5	13.0	14.0	14.0	13.0	14.0	11.0	14.0

Hole #2

Surface Finish, AA 110
Protrusion, in. 178
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .001
Flush Gage Reading, in. -.001
Capacitance Gage Reading 254
Exit Burr Height, in.

Bluing Pin Rollout

65%

319/323

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-7.0	-8.0	-6.0	-10.0	-7.0	-8.0	-7.0
#2	8.0	8.0	8.0	6.0	8.0	8.0	7.0
#3	9.0	13.0	13.0	7.0	12.0	13.0	11.0
#4	12.0	15.0	14.0	5.0	13.0	15.0	12.0
#5	11.0	12.0	13.0	11.0	11.0	12.0	13.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 21 Quality Variable SURFACE-ROUGHNESS-QUALITY
Specimen No. SE1-L-10L M.O. INT. 125 R1-5

Hole Manufacturing Conditions and Procedures: REAM UNDERSIZE REAMER 1.755. REAM MAC. LM SPIRAL REAMER. USE SPINDLE LINE REAMER PLUNGE 1.700 I.D. IN TRANSVERSE POS.

Spindle, rpm 83 Feed: .018 IPM
Cutting Fluid: DRY Depth: (Ind. Reading) 2.442

Hole #1

Surface Finish, AA 95-100
Protrusion, in. 168
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse 0
Flush Gage Reading, in. 0
Capacitance Gage Reading 237
Exit Burr Height, in.

60%

Bluing Pin Rollout

322/319

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-7.0	-5.0	-7.0	-7.0	-6.0	-5.0	-6.0
#2	7.0	8.0	9.0	3.0	7.0	9.0	7.0
#3	8.0	12.0	13.0	3.0	12.0	13.0	9.0
#4	9.0	13.0	13.0	3.0	[illegible]	15.0	12.0
#5	12.0	13.0	11.0	12.0	13.0	10.0	12.0

Hole #2

Surface Finish, AA 110
Protrusion, in. 178
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .0005
Flush Gage Reading, in. 0
Capacitance Gage Reading 226
Exit Burr Height, in.

60%

Bluing Pin Rollout

322/318

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-6.0	-8.0	-9.0	-6.0	-4.0	-6.0	-6.0
#2	7.0	8.0	11.0	6.0	0	11.0	7.0
#3	9.0	13.0	14.0	7.0	9.0	14.0	12.0
#4	12.0	14.0	15.0	9.0	13.0	14.0	14.0
#5	1[illegible]	14.0	14.0	13.0	14.0	13.0	13.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 21 Quality Variable SURFACE ROUGHNESS - QUALITY
Specimen No. 365BC-363BC MAX 0.3 IN. 125 RMS

Hole Manufacturing Conditions and Procedures: REAM UNDER SIZE REAMER 1.755 REAM .1700 WITH SPIRAL REAMER - USE STRAIGHT FLUTE REAMER PLUNGE 1.700 ±.006 IN TRAVERSE POS

Spindle, rpm 80 Feed: 55 8 I.P.M.
Cutting Fluid: DRY Depth: (Ind. Reading) 2.440

Hole #1

Surface Finish, AA 110
Protrusion, in. 155
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse 0
Flush Gage Reading, in. 0
Capacitance Gage Reading 283
Exit Burr Height, in.

Bluing Pin Rollout

65%

310/320

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-9.0	-8.0	-10.0	-10.0	-11.0	[illegible]	-8.0
#2	5.0	6.0	5.0	4.0	5.0	6.0	6.0
#3	7.0	9.0	11.0	5	7.0	10.0	[illegible]
#4	6.0	15.0	13.0	2.0	[illegible]	[illegible]	[illegible]
#5	9.0	[illegible]	13.0	5.0	[illegible]	10.0	[illegible]

Hole #2

Surface Finish, AA 100-105
Protrusion, in. 178
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .0005
Flush Gage Reading, in. 0
Capacitance Gage Reading 228
Exit Burr Height, in.

Bluing Pin Rollout

60%

~~319~~ 326

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-11.0	-7.0	-6.0	-6.0	-7.0	-10.0	-11.0
#2	7.0	9.0	11.0	5.0	8.0	7.0	6.0
#3	8.0	13.0	14.0	4.0	11.0	13.0	11.0
#4	11.0	14.0	15.0	5.0	12.0	14.0	13.0
#5	15.0	11.0	13.0	13.0	12.0	12.0	13.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 21 Quality Variable SURFACE ROUGHNESS - OVALITY
Specimen No. 3D2BC-3E2T MID INT. 125 RMS

Hole Manufacturing Conditions and Procedures: REAM UNDER-SIZE REAMER 1755 REAM MCQ. L.H. SPIRAL REAMER - USE STRAIGHT FLUTE REAMER PLUNGE 1.700 1.006 IN TRANSVERSE POS.

Spindle, rpm 80 Feed: 8 IPM

Cutting Fluid: DRY Depth: (Ind. Reading) 2.440

Hole #1

Surface Finish, AA 110

Protrusion, in. 162

Perpendicularity, .001 in./in.

Longitudinal .0005 Transverse .001

Flush Gage Reading, in. 0

Capacitance Gage Reading 228

Exit Burr Height, in.

Bluing Pin Rollout

70%

325/317

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-7.0	-6.0	-5.0	-9.0	-7.0	-6.0	-5.0
#2	7.0	10.0	11.0	6.0	9.0	11.0	9.0
#3	7.0	13.0	13.0	7.0	12.0	14.0	13.0
#4	10.0	15.0	14.0	6.0	13.0	14.0	14.0
#5	13.0	13.0	14.0	12.0	12.0	12.0	14.0

Hole #2

Surface Finish, AA 95-100

Protrusion, in. 171

Perpendicularity, .001 in./in.

Longitudinal .001 Transverse .0005

Flush Gage Reading, in. .001

Capacitance Gage Reading 236

Exit Burr Height, in.

Bluing Pin Rollout

60%

324/317

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-9.0	-10.0	-8.0	-10.0	-9.0	-8.0	-8.0
#2	6.0	9.0	11.0	5.0	9.0	9.0	7.0
#3	7.0	13.0	14.0	6.0	13.0	14.0	12.0
#4	10.0	14.0	15.0	7.0	12.0	15.0	12.0
#5	13.0	13.0	13.0	9.0	11.0	12.0	11.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 21 Quality Variable SURFACE ROUGHNESS - QUALITY
Specimen No. 6B4EG 4385BC MID. INT. 125RMS

Hole Manufacturing Conditions and Procedures: REAM UNDERSIZE [illegible] 1755. REAM [illegible] L.H. [illegible] USE [illegible] FINE [illegible] 1700 [illegible]
Spindle, rpm 80 Feed: [illegible]
Cutting Fluid: DRY Depth: (Ind. Reading) 2440

Hole #1

Surface Finish, AA 110
Protrusion, in. 168
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse 10005
Flush Gage Reading, in. .001
Capacitance Gage Reading 249
Exit Burr Height, in.

Bluing Pin Rollout

65%

Air Gage Readings (.0001 in.)
Angular Position

~~318~~
321

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-9.0	-7.0	-7.0	-6.0	-6.0	-6.0	-6.0
#2	4.0	3.0	7.0	7.0	8.0	9.0	8.0
#3	5.0	8.0	12.0	10.0	12.0	13.0	11.0
#4	7.0	11.0	14.0	11.0	[illegible]	13.0	13.0
#5	[illegible]	13.0	14.0	—	14.0	13.0	13.0

Hole #2

Surface Finish, AA 100
Protrusion, in. 164
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .001
Flush Gage Reading, in. 0
Capacitance Gage Reading 229
Exit Burr Height, in.

Bluing Pin Rollout

55%

Air Gage Readings (.0001 in.)
Angular Position

~~319~~
323

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-5.0	-5.0	-5.0	-6.0	-9.0	-9.0	[illegible]
#2	8.0	11.0	12.0	7.0	6.0	9.0	9.0
#3	10.0	14.0	15.0	6.0	11.0	13.0	16.0
#4	13.0	15.0	—	8.0	11.0	15.0	15.0
#5	14.0	13.0	14.0	[illegible]	11.0	15.0	14.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 21 Quality Variable SURFACE ROUGHNESS QUALITY [illegible]
Specimen No. 3ELS-463B [illegible] INT. 125 [illegible]

Hole Manufacturing Conditions and Procedures: REAM UNDERSIZE REAMER 1.755. REAM [illegible] REAMER. USE [illegible] FLUTE REAMER [illegible] 1.700 ± .006 [illegible]

Spindle, rpm 50 Feed: [illegible]
Cutting Fluid: DRY Depth: (Ind. Reading) .440

Hole #1

Surface Finish, AA [illegible] 95
Protrusion, in. 726
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse 0
Flush Gage Reading, in. .002
Capacitance Gage Reading 253
Exit Burr Height, in.

Bluing Pin Rollout

60%

318/321

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-4.0	-5.0	-4.0	-5.0	-5.0	-5.0	-6.0
#2	2.0	6.0	2.0	3.0	0	2.0	0
#3	6.0	10.0	10.0	3.0	7.0	10.0	6.0
#4	8.0	11.2	12.0	4.0	9.0	12.0	9.0
#5	11.0	12.0	12.0	11.0	12.0	12.0	11.0

Hole #2

Surface Finish, AA 100
Protrusion, in. 162
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse 0
Flush Gage Reading, in. 0
Capacitance Gage Reading 265
Exit Burr Height, in.

Bluing Pin Rollout

70%

318/321

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-5.0	-5.0	-5.0	-7.0	-6.0	-8.0	-6.0
#2	3.0	2.0	2.0	0	1.0	1.0	1.0
#3	4.0	4.0	6.0	3.0	5.0	7.0	5.0
#4	3.0	8.0	10.0	3.0	9.0	9.0	9.0
#5	7.0	10.0	10.0	6.0	10.0	10.0	10.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 21 Quality Variable SURFACE ROUGHNESS - QUALITY
Specimen No. 6RG4 L2A-4C M.C. IN. 125 R/S

Hole Manufacturing Conditions and Procedures: REAM UNDER SIZE REAM A.175 REAM AND L.H SPIRAL REAM USE ... INTRANSVERSE POS

Spindle, rpm 80 Feed:
Cutting Fluid: DRY Depth: (Ind. Reading) .440

Hole #1

Surface Finish, AA 100
Protrusion, in. 171
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .0015
Flush Gage Reading, in. .002
Capacitance Gage Reading 251
Exit Burr Height, in.

Bluing Pin Rollout

60%

Air Gage Readings (.0001 in.)

Angular Position

311/324

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-8.0	-9.0	-6.0	-5.0	-6.0	-8.0	-7.0
#2	1.0	2.0	4.0	1.0	0	4.0	2.0
#3	4.0	6.0	8.0	1.0	5.0	9.0	7.0
#4	4.0	10.0	11.0	0	9.0	10.0	10.0
#5	9.0	10.0	11.0	7.0	10.0	11.0	10.0

Hole #2

Surface Finish, AA 110
Protrusion, in. 171
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse .002
Flush Gage Reading, in. .001
Capacitance Gage Reading 281
Exit Burr Height, in.

Bluing Pin Rollout

65%

Air Gage Readings (.0001 in.)

Angular Position

317/323

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-9.0	-8.0	-5.0	-6.0	-8.0	-8.0	-7.0
#2	1.0	4.0	3.0	3.0	-1.0	3.0	2.0
#3	3.0	4.0	6.0	3.0	7.0	9.0	6.0
#4	4.0	9.0	10.0	3.0	10.0	11.0	7.0
#5	9.0	9.0	10.0	7.0	11.0	12.0	9.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 21 Quality Variable SURFACE ROUGHNESS [illegible]
Specimen No. 3C3TC & 3C4TC [illegible]

Hole Manufacturing Conditions and Procedures: [illegible]

Spindle, rpm 80 Feed: [illegible]
Cutting Fluid: DRY Depth: (Ind. Reading) 2.440

Hole #1

Surface Finish, AA 112
Protrusion, in. 171
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .001
Flush Gage Reading, in. 0
Capacitance Gage Reading 250
Exit Burr Height, in.

Bluing Pin Rollout

65%

Air Gage Readings (.0001 in.)
Angular Position

317/321

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-12.0	-12.0	-8.0	-5.0	-5.0	-6.0	-10.0
#2	6.0	8.0	9.0	6.0	5.0	5.0	2.0
#3	7.0	12.0	13.0	5.0	11.0	12.0	10.0
#4	9.0	13.0	14.0	7.0	13.0	13.0	12.0
#5	11.0	12.0	13.0	12.0	11.0	13.0	11.0

Hole #2

Surface Finish, AA 110
Protrusion, in. 170
Perpendicularity, .001 in./in.
Longitudinal .0 Transverse .0015
Flush Gage Reading, in. .001
Capacitance Gage Reading 247
Exit Burr Height, in.

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)
Angular Position

317/321

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-8.0	-8.0	-9.0	-7.0	-9.0	-7.0	-9.0
#2	5.0	6.0	7.0	5.0	6.0	9.0	7.0
#3	8.0	11.0	12.0	5.0	11.0	13.0	11.0
#4	10.0	13.0	14.0	5.0	12.0	14.0	13.0
#5	10.0	10.0	13.0	11.0	11.0	13.0	12.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 21 Quality Variable [illegible]
Specimen No. 6B2tL3B4/5C [illegible] 125 RMS

Hole Manufacturing Conditions and Procedures: [illegible]

Spindle, rpm 80 Feed: [illegible]
Cutting Fluid: dry Depth: (Ind. Reading) .2442

Hole #1

Surface Finish, AA 110 Bluing Pin Rollout
Protrusion, in. 128
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .0005
Flush Gage Reading, in. 0 55%
Capacitance Gage Reading 258
Exit Burr Height, in.

Air Gage Readings (.0001 in.)

311
322

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-4.0	4.0	-3.0	-5.0	-6.0	-9.0	-6.0
#2	1.0	0	2.0	3.0	2.0	2.0	1.0
#3	4.0	4.0	7.0	3.0	5.0	8.0	5.0
#4	5.0	7.0	10.0	4.0	10.0	11.0	3.0
#5	11.0	12.0	12.0	10.0	11.0	12.0	10.0

Hole #2

Surface Finish, AA 95 100 Bluing Pin Rollout
Protrusion, in. 169
Perpendicularity, .001 in./in.
Longitudinal .0 Transverse .0
Flush Gage Reading, in. 0
Capacitance Gage Reading 245 65%
Exit Burr Height, in.

Air Gage Readings (.0001 in.)

317
324

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-6.0	-5.0	-7.0	-6.0	-8.0	-7.0	-5.0
#2	2.0	3.0	3.0	4.0	4.0	6.0	3.0
#3	4.0	8.0	8.0	3.0	8.0	10.0	7.0
#4	7.0	10.0	10.0	3.0	10.0	11.0	10.0
#5	10.0	11.0	11.0	10.0	11.0	11.0	11.0

INSPECTION SHEETS FOR TEST SERIES 22 -

COMBINED VARIABLES, REVERSE DOGBONE SPECIMENS

R RATIO = -0.33

MANUFACTURING REPORT: TAPERED HOLES

Test Series 22 Quality Variable SURFACE ROUGHNESS 125 [illegible]
Specimen No. 6038CL6B5TC

Hole Manufacturing Conditions and Procedures: Ream with Under-size Reamer .1755 [illegible] Spiral Reamer

Spindle, rpm [illegible] Feed: [illegible] IPM
Cutting Fluid: [illegible] Depth: (Ind. Reading) [illegible]

Hole #1

Surface Finish, AA 110-125
Protrusion, in. 168
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse 0
Flush Gage Reading, in. 0
Capacitance Gage Reading 297
Exit Burr Height, in.

Bluing Pin Rollout

65%

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-9.0	-9.0	-11.0	-6.0	-6.0	-7.0	-9.0
#2	3.0	2.0	1.0	4.0	3.0	4.0	4.0
#3	6.0	4.0	3.0	3.0	3.0	4.0	5.0
#4	4.0	2.0	1.0	2.0	2.0	3.0	3.0
#5	6.0	5.0	4.0	4.0	2.0	4.0	5.0

Hole #2

Surface Finish, AA 95-105
Protrusion, in. 182
Perpendicularity, .001 in./in.
Longitudinal .0015 Transverse 0
Flush Gage Reading, in. 0
Capacitance Gage Reading 315
Exit Burr Height, in.

Bluing Pin Rollout

85%

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-6.0	-5.0	-5.0	-9.0	-10.0	-10.0	-8.0
#2	3.0	3.0	3.0	1.0	1.0	1.0	3.0
#3	4.0	4.0	3.0	2.0	2.0	2.0	4.0
#4	1.0	3.0	0	3.0	4.0	4.0	3.0
#5	2.0	2.0	1.0	5.0	4.0	4.0	3.0

Figure 14 - Sample Manufacturing Report: Tapered Holes

MANUFACTURING REPORT: TAPERED HOLES

Test Series 22 Quality Variable Surface Roughness 125 [illegible]
Specimen No. 3D3BCL3H4TC

Hole Manufacturing Conditions and Procedures: [illegible]

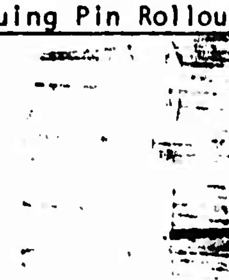
Spindle, rpm 80 Feed: 5 8 IPM
Cutting Fluid: DRY Depth: (Ind. Reading) .450

Hole #1

Surface Finish, AA 95-105
Protrusion, in. 170
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse .0015
Flush Gage Reading, in. .001
Capacitance Gage Reading 277
Exit Burr Height, in.

80%

Bluing Pin Rollout



Air Gage Readings (.0001 in.)

Angular Position

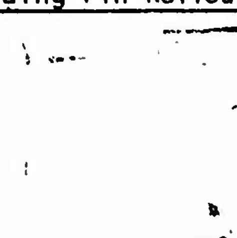
Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-7.0	[illegible]	-8.0	-6.0	-5.0	-7.0	-6.0
#2	3.0	2.0	3.0	4.0	6.0	5.0	6.0
#3	2.0	3.0	4.0	5.0	4.0	4.0	4.0
#4	4.0	4.0	3.0	3.0	1.0	3.0	3.0
#5	6.0	7.0	6.0	5.0	2.0	3.0	5.0

Hole #2

Surface Finish, AA 100-110
Protrusion, in. 179
Perpendicularity, .001 in./in.
Longitudinal .0005 Transverse .001
Flush Gage Reading, in. .002
Capacitance Gage Reading 291
Exit Burr Height, in.

85%

Bluing Pin Rollout



Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-7.0	-3.0	-5.0	-6.0	-10.0	-7.0	-8.0
#2	2.0	5.0	4.0	3.0	2.0	1.0	2.0
#3	4.0	5.0	4.0	3.0	3.0	2.0	0
#4	3.0	3.0	1.0	2.0	4.0	3.0	0
#5	4.0	4.0	1.0	5.0	6.0	5.0	2.0

Figure 14 - Sample Manufacturing Report: Tapered Holes

MANUFACTURING REPORT: TAPERED HOLES

Test Series 22 Quality Variable SURFACE ROUGHNESS 125 RMS
Specimen No. 4B1TCL2B6BC

Hole Manufacturing Conditions and Procedures: REAM WITH UNDER-SIZE REAMER .7235 REAM AND L.H. SPIRAL REAMER

Spindle, rpm 80 Feed: 5.8 I.P.M.
Cutting Fluid: DRY Depth: (Ind. Reading) 2.450

Hole #1

Surface Finish, AA 110-115 **Bluing Pin Rollout**
Protrusion, in. 172
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .0005 80%
Flush Gage Reading, in. 0
Capacitance Gage Reading 281
Exit Burr Height, in.

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-4.0	-6.0	-8.0	-8.0	-7.0	-6.0	-8.0
#2	4.0	4.0	3.0	4.0	4.0	3.0	2.0
#3	6.0	4.0	2.0	5.0	4.0	4.0	4.0
#4	3.0	3.0	2.0	4.0	2.0	2.0	3.0
#5	5.0	4.0	3.0	5.0	3.0	4.0	5.0

Hole #2

Surface Finish, AA 95-105 **Bluing Pin Rollout**
Protrusion, in. 122
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse 0 75%
Flush Gage Reading, in. .001
Capacitance Gage Reading 312
Exit Burr Height, in.

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-5.0	-9.0	-9.0	-7.0	-8.0	-6.0	-8.0
#2	4.0	2.0	1.0	4.0	4.0	5.0	4.0
#3	4.0	4.0	3.0	4.0	4.0	4.0	2.0
#4	3.0	2.0	2.0	4.0	5.0	3.0	2.0
#5	5.0	4.0	3.0	3.0	5.0	5.0	3.0

Figure 14 - Sample Manufacturing Report: Tapered Holes

MANUFACTURING REPORT: TAPERED HOLES

Test Series 22 Quality Variable Surface Roughness 125 RMS
Specimen No. 2E3BC-3B3TC

Hole Manufacturing Conditions and Procedures: Ream With Under-size Reamer .1757 Ream Again With Special Reamer [illegible]

Spindle, rpm 80 Feed: [illegible] IPM
Cutting Fluid: DRY Depth: (Ind. Reading) 2450

Hole #1

Surface Finish, AA 100
Protrusion, in. .165
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse 0
Flush Gage Reading, in. .001
Capacitance Gage Reading 318
Exit Burr Height, in.

Bluing Pin Rollout 75%

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-6.0	-6.0	-7.0	-9.0	-9.0	-10.0	-8.0
#2	5.0	4.0	5.0	3.0	4.0	4.0	5.0
#3	4.0	2.0	3.0	2.0	2.0	2.0	4.0
#4	2.0	1.0	3.0	1.0	2.0	2.0	3.0
#5	2.0	4.0	4.0	4.0	3.0	3.0	4.0

Hole #2

Surface Finish, AA 100-110
Protrusion, in. .158
Perpendicularity, .001 in./in.
Longitudinal .0015 Transverse 0
Flush Gage Reading, in. 0
Capacitance Gage Reading 309
Exit Burr Height, in.

Bluing Pin Rollout 85%

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-10.0	-7.0	-8.0	-7.0	-8.0	-9.0	-5.0
#2	4.0	4.0	4.0	4.0	4.0	4.0	2.0
#3	4.0	4.0	4.0	3.0	3.0	4.0	2.0
#4	4.0	3.0	2.0	1.0	4.0	2.0	2.0
#5	5.0	4.0	4.0	3.0	4.0	4.0	3.0

Figure 14 - Sample Manufacturing Report: Tapered Holes

MANUFACTURING REPORT: TAPERED HOLES

Test Series 22 Quality Variable Surface Roughness 125...
Specimen No. 4CITC + 60, -2

Hole Manufacturing Conditions and Procedures: Ream With Under-size Reamer 1.755. Ream with L.H. Spiral Reamer

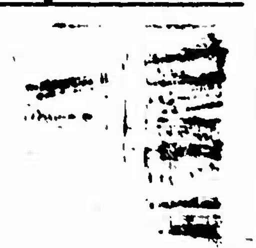
Spindle, rpm 80 Feed: 5 R.I.P.M.
Cutting Fluid: DRY Depth: (Ind. Reading) .2452

Hole #1

Surface Finish, AA 100-110
Protrusion, in. 170
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse .0015
Flush Gage Reading, in. .001
Capacitance Gage Reading 283
Exit Burr Height, in. ____

80%

Bluing Pin Rollout



Air Gage Readings (.0001 in.)
Angular Position

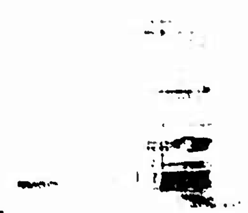
Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-5.0	-1.0	-3.0	-5.0	-12.0	-9.0	-5.0
#2	7.0	8.0	7.0	5.0	6.0	5.0	6.0
#3	6.0	6.0	5.0	4.0	4.0	4.0	5.0
#4	5.0	3.0	2.0	3.0	5.0	5.0	4.0
#5	6.0	4.0	3.0	4.0	7.0	6.0	6.0

Hole #2

Surface Finish, AA 100
Protrusion, in. 164
Perpendicularity, .001 in./in.
Longitudinal .0025 Transverse 0
Flush Gage Reading, in. 0
Capacitance Gage Reading 319
Exit Burr Height, in. ____

90%

Bluing Pin Rollout



Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-5.0	-4.0	-6.0	-9.0	-9.0	-8.0	-7.0
#2	4.0	4.0	2.0	3.0	3.0	3.0	3.0
#3	4.0	4.0	2.0	4.0	3.0	3.0	3.0
#4	2.0	1.0	0	5.0	5.0	3.0	2.0
#5	3.0	0	2.0	5.0	6.0	4.0	2.0

Figure 14 - Sample Manufacturing Report: Tapered Holes

MANUFACTURING REPORT: TAPERED HOLES

Test Series 22 Quality Variable SURFACE-ROUGHNESS
Specimen No. 60STCL 6C4TC A7.0. INT. 125RMS

Hole Manufacturing Conditions and Procedures: REAM UNDER-SIZE REAMER 1755 REAM W/ L.H SPIRAL REAMER.

Spindle, rpm 80 Feed: 8 IPM
Cutting Fluid: DRY Depth: (Ind. Reading) 2.440

Hole #1

Surface Finish, AA 110
Protrusion, in. 176
Perpendicularity, .001 in./in.
Longitudinal .0015 Transverse .001
Flush Gage Reading, in. 0
Capacitance Gage Reading 265
Exit Burr Height, in.

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-10.0	-10.0	-7.0	-7.0	-6.0	-7.0	-6.0
#2	3.0	3.0	3.0	2.0	1.0	2.0	2.0
#3	5.0	5.0	4.0	2.0	1.0	1.0	2.0
#4	4.0	5.0	3.0	1.0	1.0	2.0	2.0
#5	6.0	6.0	6.0	6.0	5.0	6.0	7.0

Hole #2

Surface Finish, AA 100
Protrusion, in. 182
Perpendicularity, .001 in./in.
Longitudinal .0015 Transverse .001
Flush Gage Reading, in. .001
Capacitance Gage Reading 313
Exit Burr Height, in.

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-7.0	-7.0	-7.0	-8.0	-7.0	-6.0	-7.0
#2	2.0	-1.0	-4.0	1.0	0	1.0	2.0
#3	2.0	3.0	3.0	2.0	1.0	0	0
#4	1.0	3.0	2.0	2.0	0	0	[illegible]
#5	6.0	8.0	8.0	7.0	5.0	7.0	5.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 22 Quality Variable SURFACE - ROUGHNESS
Specimen No. LB2BCL4C1BC [illegible]

Hole Manufacturing Conditions and Procedures: REAM UNDER SIZE [illegible] REAM [illegible] W/ SPIRAL REAMER

Spindle, rpm 80 Feed: 8 IPM
Cutting Fluid: DRY Depth: (Ind. Reading) 2.440

Hole #1

Surface Finish, AA 95
Protrusion, in. 158
Perpendicularity, .001 in./in.
Longitudinal .002 Transverse 0
Flush Gage Reading, in. 0
Capacitance Gage Reading 322
Exit Burr Height, in.

70%

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-15.0	-13.0	-14.0	-12.0	-12.0	-12.0	-12.0
#2	3.0	3.0	2.0	3.0	4.0	4.0	3.0
#3	5.0	5.0	4.0	4.0	5.0	5.0	5.0
#4	5.0	5.0	3.0	3.0	5.0	5.0	5.0
#5	5.0	5.0	3.0	4.0	6.0	6.0	5.0

Hole #2

Surface Finish, AA 90
Protrusion, in. 171
Perpendicularity, .001 in./in.
Longitudinal .0005 Transverse .0015
Flush Gage Reading, in. 0
Capacitance Gage Reading 303
Exit Burr Height, in.

70%

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-12.0	-13.0	-14.0	-8.0	-7.0	-8.0	-14.0
#2	4.0	4.0	4.0	2.0	4.0	3.0	3.0
#3	5.0	5.0	5.0	3.0	3.0	2.0	5.0
#4	[illegible]	4.0	4.0	4.0	1.0	2.0	4.0
#5	6.0	5.0	4.0	5.0	6.0	3.0	5.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 22 Quality Variable SURFACE - ROUGHNESS
Specimen No. 4C1+C L6D3T [illegible]

Hole Manufacturing Conditions and Procedures: [illegible]
BENDER 1.755 BENDER [illegible]

Spindle, rpm 80 Feed: 58 IP[illegible]
Cutting Fluid: Dry Depth: (Ind. Reading) .446

Hole #1

Surface Finish, AA 95 Bluing Pin Rollout
Protrusion, in. 170
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .001 85%
Flush Gage Reading, in. 0
Capacitance Gage Reading 298
Exit Burr Height, in.

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-10.0	-10.0	-9.0	-8.0	-11.0	-11.0	-9.0
#2	2.0	2.0	3.0	2.0	2.0	3.0	3.0
#3	2.0	3.0	4.0	4.0	3.0	2.0	3.0
#4	2.0	3.0	4.0	4.0	3.0	2.0	3.0
#5	6.0	7.0	6.0	8.0	6.0	6.0	8.0

Hole #2

Surface Finish, AA 105 Bluing Pin Rollout
Protrusion, in. 180
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .001 80%
Flush Gage Reading, in. 0
Capacitance Gage Reading 308
Exit Burr Height, in.

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-12.0	-8.0	-9.0	-8.0	-8.0	-8.0	-9.0
#2	2.0	3.0	4.0	3.0	3.0	3.0	3.0
#3	3.0	4.0	4.0	5.0	5.0	4.0	3.0
#4	2.0	4.0	6.0	5.0	5.0	5.0	2.0
#5	5.0	7.0	9.0	5.0	8.0	7.0	6.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 22 Quality Variable SURFACE ROUGHNESS
Specimen No. 66SBL3135TC [illegible] 125 R[illegible]

Hole Manufacturing Conditions and Procedures: [illegible]
[illegible] REAMER

Spindle, rpm 80 Feed: 8 IPM
Cutting Fluid: DRY Depth: (Ind. Reading) 2.446

Hole #1

Surface Finish, AA 115
Protrusion, in. .176
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse 0
Flush Gage Reading, in. 0
Capacitance Gage Reading 307
Exit Burr Height, in.

Bluing Pin Rollout

85%

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-9.0	-9.0	[illegible]	-6.0	[illegible]	[illegible]	-7.0
#2	0	[illegible]	1.0	3.0	2.0	1.0	3.0
#3	3.0	3.[illegible]	3.0	3.0	2.0	3.[illegible]	3.0
#4	3.0	2.0	2.0	1.0	2.0	3.0	3.0
#5	6.0	5.0	5.0	5.0	6.0	6.0	6.[illegible]

Hole #2

Surface Finish, AA 110
Protrusion, in. .183
Perpendicularity, .001 in./in.
Longitudinal .0015 Transverse .0025
Flush Gage Reading, in. .001
Capacitance Gage Reading 308
Exit Burr Height, in.

Bluing Pin Rollout

85%

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-5.0	-6.0	-6.0	-4.0	-7.0	-5.0	-5.0
#2	1.0	4.0	4.0	2.0	2.0	-1.0	0
#3	2.0	3.0	3.0	3.0	3.0	3.0	4.0
#4	3.0	3.0	2.0	2.0	3.0	3.0	4.0
#5	8.0	7.0	[illegible]	7.0	5.0	5.0	8.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 22 Quality Variable SUR. [illegible] ROUGHNESS
Specimen No. 3C21C 3[illegible] [illegible]

Hole Manufacturing Conditions and Procedures: [illegible]
[illegible]

Spindle, rpm [illegible] Feed: [illegible]
Cutting Fluid: DRY Depth: (Ind. Reading) [illegible]

Hole #1

Surface Finish, AA 9[illegible] 161
Protrusion, in.
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse 0
Flush Gage Reading, in. 0
Capacitance Gage Reading 318
Exit Burr Height, in.

Bluing Pin Rollout

75%

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-10.0	-11.0	-10.0	-10.0	-9.0	-7.0	-10.0
#2	2.0	2.0	2.0	3.0	3.0	3.0	3.0
#3	4.0	5.0	5.0	3.0	2.0	4.0	4.0
#4	4.0	4.0	4.0	4.0	0	4.0	4
#5	5.0	4.0	5.0	4.0	3.0	5.0	5.0

Hole #2

Surface Finish, AA 110
Protrusion, in. 173
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .002
Flush Gage Reading, in. .001
Capacitance Gage Reading 297
Exit Burr Height, in.

Bluing Pin Rollout

85%

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-14.0	-12.0	-12.0	-13.0	-12.[illegible]	-13.0	-14.0
#2	3.0	3.0	3.0	4.0	3.0	3.0	3.0
#3	5.0	6.0	6.0	5.0	5.0	5.0	5.0
#4	5.0	4.0	5.0	5.0	5.0	5.0	5.0
#5	6.0	7.0	7.0	6.0	5.0	6.0	6.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 22 Quality Variable SURFACE ROUGHNESS - SCRATCH
Specimen No. 306BC-3C413C MID INT 125 RMS

Hole Manufacturing Conditions and Procedures: REAM WITH UNDER-SIZE REAMER 1.955 REAM MOD. L.H. SPIRAL REAMER USE BORING TOOL SET, 45° & PULL OUT FOR SCRATCH

Spindle, rpm 80 Feed: .5 E.P.M.
Cutting Fluid: DRY Depth: (Ind. Reading) 2.450

Hole #1

Surface Finish, AA 115-120
Protrusion, in. 174
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .001
Flush Gage Reading, in. -.001
Capacitance Gage Reading 248
Exit Burr Height, in.

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	180°	225°	270°	315°
Bottom #1	-5.0	-8.0	-11.0	-[illegible]	-4.0	-11.0	-8.0
#2	6.0	5.0	3.0	4.0	7.0	4.0	7.0
#3	9.0	7.0	5.0	5.0	8.0	5.0	8.0
#4	10.0	8.0	5.0	3.0	8.0	5.0	8.0
#5	10.0	11.0	9.0	8.0	8.0	5.0	8.0

Hole #2

Surface Finish, AA 95-100
Protrusion, in. 178
Perpendicularity, .001 in./in.
Longitudinal .0 Transverse .001
Flush Gage Reading, in. .002
Capacitance Gage Reading 231
Exit Burr Height, in.

Bluing Pin Rollout

75%

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	180°	225°	270°	315°
Bottom #1	-5.0	-8.0	-9.0	-5.0	-5.0	-10.0	-8.0
#2	6.0	6.0	4.0	4.0	6.0	6.0	7.0
#3	8.0	7.0	6.0	5.0	7.0	7.0	8.0
#4	8.0	6.0	5.0	4.0	7.0	7.0	8.0
#5	[illegible]	10.0	9.0	10.0	10.0	9.0	8.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 22 Quality Variable SURFACE-ROUGHNESS-SCRATCH
Specimen No. LB4TC-2E4TC M.O.INT. 125 R.M.S.

Hole Manufacturing Conditions and Procedures: REAM WITH UNDER SIZE REAMER 1.255. REAM M.D. L.H. SP... USE B... TOOL SET .005 PULL OUT FOR SCRATCH

Spindle, rpm 80 Feed: 5 8 I.P.M.
Cutting Fluid: DRY Depth: (Ind. Reading) 2.450

Hole #1

Surface Finish, AA 115-120
Protrusion, in. 174
Perpendicularity, .001 in./in.
Longitudinal .0005 Transverse .001
Flush Gage Reading, in. .002
Capacitance Gage Reading 238
Exit Burr Height, in.

65%

Bluing Pin Rollout

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-8.0	-10.0	-11.0	-7.0	-3.0	-7.0	-9.0
#2	6.0	6.0	5.0	6.0	7.0	5.0	5.0
#3	8.0	6.0	6.0	6.0	7.0	7.0	7.0
#4	7.0	6.0	4.0	4.0	7.0	6.0	7.0
#5	9.0	8.0	7.0	7.0	8.0	7.0	8.0

Hole #2

Surface Finish, AA 85-95
Protrusion, in. 176
Perpendicularity, .001 in./in.
Longitudinal .0015 Transverse 0
Flush Gage Reading, in. 0
Capacitance Gage Reading 225
Exit Burr Height, in.

75%

Bluing Pin Rollout

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-3.0	-5.0	-7.0	-5.0	-3.0	-5.0	-4.0
#2	9.0	8.0	7.0	6.0	8.0	7.0	8.0
#3	10.0	9.0	8.0	7.0	9.0	7.0	7.0
#4	11.0	10.0	8.0	4.0	8.0	7.0	9.0
#5	13.0	11.0	11.0	10.0	10.0	11.0	11.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 12 Quality Variable SURFACE ROUGHNESS-SCRATCH MID-INT. 125 RMS
Specimen No. 3E6TC-2E2TC

Hole Manufacturing Conditions and Procedures: REAM WITH UNDER-SIZE REAMER 1.755. REAM W/ L.H. SPIRAL REAMER USE BORING TOOL SET .003 & PULL OUT FOR SCRATCH

Spindle, rpm 80 Feed: 37 X IPM
Cutting Fluid: DRY Depth: (Ind. Reading) .4[illegible]

Hole #1

Surface Finish, AA 100
Protrusion, in. 172
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .001
Flush Gage Reading, in. .002
Capacitance Gage Reading 225
Exit Burr Height, in.

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-5.0	-6.0	-7.0	-7.0	-5.0	-8.0	-6.0
#2	7.0	5.0	4.0	5.0	8.0	6.0	7.0
#3	9.0	7.0	6.0	7.0	6.0	8.0	9.0
#4	9.0	8.0	7.0	6.0	7.0	8.0	9.0
#5	10.0	10.0	9.0	7.0	7.0	8.0	9.0

Hole #2

Surface Finish, AA 100
Protrusion, in. 168
Perpendicularity, .001 in./in.
Longitudinal .0005 Transverse .0015
Flush Gage Reading, in. -.001
Capacitance Gage Reading 225
Exit Burr Height, in.

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-5.0	-5.0	-8.0	-7.0	-5.0	-10.0	-9.0
#2	6.0	5.0	3.0	6.0	8.0	8.0	9.0
#3	7.0	7.0	5.0	7.0	8.0	7.0	8.0
#4	8.0	9.0	5.0	5.0	8.0	5.0	8.0
#5	9.0	9.0	7.0	5.0	7.0	6.0	7.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 22 Quality Variable SURFACE ROUGHNESS - SCRATCH
Specimen No. 3B3B [illegible] TC MID INT. 125 [illegible]

Hole Manufacturing Conditions and Procedures: REAM WITH UNDER-SIZE REAMER 1.755 REAM [illegible] SPIRAL REAMER USE BORING TOOL SET .005 PULL OUT FOR SCRATCH

Spindle, rpm 80 Feed: [illegible] 8 I.P.M.
Cutting Fluid: DRY Depth: (Ind. Reading) 2.450

Hole #1

Surface Finish, AA 95-100
Protrusion, in. 177
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse 0
Flush Gage Reading, in. -.002
Capacitance Gage Reading 236
Exit Burr Height, in.

Bluing Pin Rollout

65%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-8.0	-8.0	-9.0	-6.0	-6.0	-7.0	-8.0
#2	5.0	6.0	6.0	7.0	7.0	7.0	5.0
#3	7.0	7.0	8.0	9.0	7.0	8.0	6.0
#4	8.0	8.0	7.0	9.0	9.0	8.0	4.0
#5	10.0	11.0	11.0	11.0	11.0	9.0	10.0

Hole #2

Surface Finish, AA 115
Protrusion, in. 185
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .001
Flush Gage Reading, in. .002
Capacitance Gage Reading 232
Exit Burr Height, in.

Bluing Pin Rollout

75%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-6.0	-6.0	-7.0	-5.0	-4.0	-9.0	-9.0
#2	6.0	5.0	5.0	5.0	6.0	5.0	5.0
#3	8.0	8.0	7.0	7.0	8.0	6.0	7.0
#4	9.0	8.0	8.0	5.0	7.0	5.0	6.0
#5	11.0	11.0	11.0	9.0	10.0	6.0	6.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 22 Quality Variable SURFACE ROUGHNESS - SCRATCH

Specimen No. 2B1BC-6B3B

Hole Manufacturing Conditions and Procedures: REAM WITH UNDERSIZE REAMER 1.255 REAM MOD L.H. SPIRAL REAMER. USE BALLING TOOL SET .005 PULL OUT FOR SCRATCH

Spindle, rpm 80 Feed: 8 I.P.M.

Cutting Fluid: DRY Depth: (Ind. Reading) 2.450

Hole #1

Surface Finish, AA 100

Protrusion, in. 188

Perpendicularity, .001 in./in.

Longitudinal .001 Transverse .001

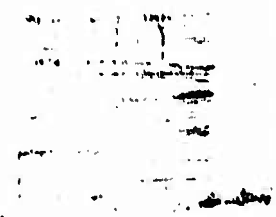
Flush Gage Reading, in. -.001

Capacitance Gage Reading 213

Exit Burr Height, in.

80%

Bluing Pin Rollout



Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-5.0	-9.0	-6.0	-5.0	-4.0	-7.0	-7.0
#2	8.0	5.0	4.0	5.0	6.0	5.0	7.0
#3	9.0	7.0	7.0	7.0	8.0	8.0	8.0
#4	9.0	8.0	7.0	7.0	7.0	8.0	9.0
#5	13.0	10.0	10.0	10.0	12.0	9.0	11.0

Hole #2

Surface Finish, AA 100

Protrusion, in. 184

Perpendicularity, .001 in./in.

Longitudinal 0 Transverse .0025

Flush Gage Reading, in. 0

Capacitance Gage Reading 239

Exit Burr Height, in.

80%

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-5.0	-8.0	-8.0	-6.0	-4.0	-9.0	-9.0
#2	6.0	4.0	5.0	7.0	8.0	7.0	6.0
#3	7.0	6.0	6.0	8.0	9.0	8.0	7.0
#4	8.0	7.0	6.0	8.0	9.0	6.0	7.0
#5	11.0	12.0	12.0	11.0	10.0	9.0	8.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 22 Quality Variable Sw[illegible]
Specimen No. [illegible] [illegible]

Hole Manufacturing Conditions and Procedures: [illegible] SIZE [illegible] .1755 REAM [illegible] REAMER USE BORING TOOL SET .0005 [illegible]

Spindle, rpm ______ Feed: [illegible] IPM
Cutting Fluid: [illegible] Depth: (Ind. Reading) .440

Hole #1

Surface Finish, AA 100
Protrusion, in. 182
Perpendicularity, .001 in./in.
Longitudinal .002 Transverse .0035
Flush Gage Reading, in. 0
Capacitance Gage Reading 337
Exit Burr Height, in. ______

75%

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	180°	225°	270°	315°
Bottom #1	-8.0	-10.0	-10.0	-10.0	-8.0	-11.0	-11.0
#2	2.0	1.0	2.0	3.0	4.0	3.0	3.0
#3	5.0	4.0	4.0	4.0	4.0	3.0	4.0
#4	5.0	3.0	3.0	4.0	3.0	3.0	4.0
#5	6.0	7.0	6.0	6.0	7.0	6.0	5.0

Hole #2

Surface Finish, AA 110
Protrusion, in. 174
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse 0
Flush Gage Reading, in. -.002
Capacitance Gage Reading 318
Exit Burr Height, in. ______

70%

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Axial Position	Angular Position 0°	45°	90°	180°	225°	270°	315°
Bottom #1	-9.0	-11.0	-11.0	-9.0	-8.0	-11.0	-10.0
#2	3.0	1.0	1.0	3.0	4.0	3.0	3.0
#3	5.0	5.0	4.0	4.0	4.0	3.0	5.0
#4	6.0	4.0	3.0	6.0	4.0	3.0	5.0
#5	7.0	7.0	6.0	7.0	7.0	5.0	6.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 22 Quality Variable SURFACE ROUGHNESS - SCRATCH
Specimen No. 3B4IBC - 4BIBC PILOT JET 125 RMS

Hole Manufacturing Conditions and Procedures: REAM UNDER SIZE [illegible] .175, REAM [illegible] SPECIAL REAMER USE [illegible] SCREW [illegible]

Spindle, rpm 8[illegible] Feed: [illegible]
Cutting Fluid: D[illegible] Depth: (Ind. Reading) 2.440

Hole #1

Surface Finish, AA 110
Protrusion, in. 166
Perpendicularity, .001 in./in.
Longitudinal .0005 Transverse 0
Flush Gage Reading, in. -.001
Capacitance Gage Reading 243
Exit Burr Height, in.

Bluing Pin Rollout

75%

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-13.0	-13.0	-9.0	-7.0	-4.0	-7.0	-9.0
#2	2.0	3.0	2.0	2.0	0	2.0	2.0
#3	3.0	3.0	2.0	3.0	2.0	3.0	3.0
#4	2.0	1.0	1.0	3.0	2.0	3.0	3.0
#5	3.0	3.0	4.0	4.0	5.0	5.0	6.0

Hole #2

Surface Finish, AA 100
Protrusion, in. 176
Perpendicularity, .001 in./in.
Longitudinal .0025 Transverse .001
Flush Gage Reading, in. -.002
Capacitance Gage Reading 254
Exit Burr Height, in.

Bluing Pin Rollout

80%

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-5.0	-7.0	-7.0	-8.0	-6.0	-5.0	-5.0
#2	2.0	2.0	1.0	1.0	2.0	3.0	3.0
#3	3.0	2.0	2.0	3.0	4.0	4.0	4.0
#4	3.0	2.0	1.0	4.0	4.0	4.0	5.0
#5	10.0	9.0	8.0	9.0	8.0	9.0	9.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 22 Quality Variable SURFACE [illegible] - SCRATCH
Specimen No. 6DSTL6B1BC [illegible]

Hole Manufacturing Conditions and Procedures: [illegible] UNDER SIZE REAMER [illegible] REAMER [illegible] L.H. SPIRAL REAMER [illegible]
Spindle, rpm 80 Feed: [illegible]
Cutting Fluid: DRY Depth: (Ind. Reading) .040

Hole #1

Surface Finish, AA 90 [illegible]
Protrusion, in. 174
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse 0
Flush Gage Reading, in. -.001
Capacitance Gage Reading 243
Exit Burr Height, in.

Bluing Pin Rollout

70%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-14.0	-13.0	-14.0	-13.0	-14.0	-14.0	-14.0
#2	3.0	3.0	3.0	3.0	3.0	3.0	3.0
#3	5.0	5.0	5.0	4.0	5.0	5.0	5.0
#4	5.0	5.0	4.0	4.0	4.0	4.0	5.0
#5	5.0	5.0	4.0	4.0	4.0	5.0	5.0

Hole #2

Surface Finish, AA 100 - 135
Protrusion, in. 166
Perpendicularity, .001 in./in.
Longitudinal .0005 Transverse .001
Flush Gage Reading, in. 0
Capacitance Gage Reading -18
Exit Burr Height, in.

Bluing Pin Rollout

80%

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-11.0	-14.0	-12.0	-14.0	-14.0	-12.0	-14.0
#2	3.0	3.0	3.0	4.0	3.0	3.0	3.0
#3	6.0	5.0	4.0	5.0	5.0	5.0	5.0
#4	5.0	4.0	3.0	5.0	5.0	5.0	5.0
#5	5.0	5.0	5.0	6.0	5.0	5.0	6.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 22 Quality Variable SURFACE ROUGHNESS - SCRATCH
Specimen No. 6123BL4195BC MID ENT. 125 RMS

Hole Manufacturing Conditions and Procedures: REAM UNDER-SIZE REAMER 1.255 REAM MOD. L.H. SPIRAL REAMER USE BORING TOOL SET .005 [illegible] FOR S[illegible]

Spindle, rpm 80 Feed: 55 P.I.P.M.
Cutting Fluid: DRY Depth: (Ind. Reading) 2.440

Hole #1

Surface Finish, AA 100
Protrusion, in. 171
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse .002
Flush Gage Reading, in. .0
Capacitance Gage Reading 248
Exit Burr Height, in. ______

15%

Bluing Pin Rollout

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-14.0	-14.0	-14.0	-13.0	-13.0	-13.0	-14.0
#2	2.0	1.0	2.0	3.0	4.0	3.0	3.0
#3	5.0	4.0	4.0	4.0	5.0	4.0	5.0
#4	4.0	3.0	3.0	4.0	4.0	4.0	5.0
#5	5.0	4.0	4.0	5.0	6.0	4.0	5.0

Hole #2

Surface Finish, AA 110
Protrusion, in. 174
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse .002
Flush Gage Reading, in. -.001
Capacitance Gage Reading 228
Exit Burr Height, in. ______

80%

Bluing Pin Rollout

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-11.0	-12.0	-12.0	-12.0	-11.0	-12.0	-12.0
#2	3.0	3.0	2.0	3.0	3.0	3.0	4.0
#3	5.0	4.0	4.0	4.0	4.0	5.0	5.0
#4	5.0	3.0	3.0	4.0	4.0	5.0	5.0
#5	5.0	4.0	5.0	5.0	5.0	4.0	6.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 22 Quality Variable [illegible]
Specimen No. [illegible]

Hole Manufacturing Conditions and Procedures: [illegible]

Spindle, rpm [illegible] Feed: [illegible]
Cutting Fluid: [illegible] Depth: (Ind. Reading) [illegible]

Hole #1

Surface Finish, AA 115
Protrusion, in. 183
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse 0
Flush Gage Reading, in. 0
Capacitance Gage Reading 242
Exit Burr Height, in.

75%

Bluing Pin Rollout

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-10.0	-10.0	-11.0	-11.0	-10.0	-11.0	-11.0
#2	3.0	3.0	2.0	2.0	3.0	3.0	3.0
#3	4.0	4.0	4.0	5.0	5.0	4.0	5.0
#4	5.0	4.0	3.0	4.0	5.0	4.0	5.0
#5	6.0	8.0	8.0	8.0	9.0	7.0	6.0

Hole #2

Surface Finish, AA 105
Protrusion, in. 172
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse 0
Flush Gage Reading, in. -.001
Capacitance Gage Reading 244
Exit Burr Height, in.

75%

Bluing Pin Rollout

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-13.0	-13.0	-13.0	-14.0	-13.0	-14.0	-13.0
#2	3.0	3.0	3.0	3.0	3.0	2.0	3.0
#3	5.0	4.0	4.0	5.0	5.0	4.0	5.0
#4	5.0	3.0	3.0	3.0	3.0	3.0	5.0
#5	6.0	5.0	5.0	5.0	6.0	4.0	5.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 12 Quality Variable SURFACE ROUGHNESS-QUALITY
Specimen No. 4A1TC-6C6TC M.O. INT 125 RMS

Hole Manufacturing Conditions and Procedures: REAM UNDER SIZE REAMER 1.755 REAM N.U.L.H. SPIRAL REAMER USE STRAIGHT FLUTE REAMER PLUNGE 1.700 ±.006 IN TRANSVERSE POS

Spindle, rpm 80 Feed: 5.8 I.P.M.
Cutting Fluid: DRY Depth: (Ind. Reading) 2.440

Hole #1

Surface Finish, AA 110
Protrusion, in. 178
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse .002
Flush Gage Reading, in. -.002
Capacitance Gage Reading 251
Exit Burr Height, in.

70%

Bluing Pin Rollout

319/324

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-9.0	-7.0	-8.0	-[illegible].0	-8.0	-9.0	-9.0
#2	6.0	9.0	10.0	4.0	12.0	8.0	5.0
#3	8.0	13.0	13.0	4.0	14.0	12.0	8.0
#4	10.0	15.0	15.0	5.0	14.0	13.0	10.0
#5	11.0	12.0	13.0	10.0	—	11.0	12.0

Hole #2

Surface Finish, AA 100
Protrusion, in. 158
Perpendicularity, .001 in./in.
Longitudinal .0005 Transverse .002
Flush Gage Reading, in. -.001
Capacitance Gage Reading 251
Exit Burr Height, in.

60%

Bluing Pin Rollout

319/324

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-9.0	-11.0	-11.0	-10.0	-9.0	-8.0	-8.0
#2	6.0	6.0	8.0	5.0	7.0	10.0	7.0
#3	8.0	11.0	12.0	6.0	11.0	13.0	10.0
#4	11.0	13.0	14.0	4.0	11.0	12.0	13.0
#5	10.0	10.0	10.0	8.0	12.0	12.0	13.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 22 Quality Variable SURFACE-ROUGHNESS OVALITY
Specimen No. 4B113C-2C4TC MID INT. 125 RMS

Hole Manufacturing Conditions and Procedures: REAM UNDERSIZE REAMER 1.755 REAM MOD. L.H. SPIRAL REAMER USE STRAIGHT FLUTE REAMER PLUNGE 1.700 LOCK IN TRANSVERSE POS

Spindle, rpm 80 Feed: 8 I.P.M.
Cutting Fluid: DRY Depth: (Ind. Reading) 2.440

Hole #1

Surface Finish, AA 100-100
Protrusion, in. 160
Perpendicularity, .001 in./in.
Longitudinal .0015 Transverse 0
Flush Gage Reading, in. 0
Capacitance Gage Reading 280
Exit Burr Height, in.

75%

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

318/3-4

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-11.0	-10.0	-10.0	-10.0	-8.0	-9.0	-10.0
#2	6.0	6.0	6.0	5.0	7.0	7.0	6.0
#3	6.0	10.0	11.0	3.0	11.0	12.0	9.0
#4	8.0	13.0	13.0	1.0	12.0	14.0	11.0
#5	10.0	12.0	12.0	9.0	13.0	10.0	10.0

Hole #2

Surface Finish, AA 100-105
Protrusion, in. 164
Perpendicularity, .001 in./in.
Longitudinal .0065 Transverse .002
Flush Gage Reading, in. -.001
Capacitance Gage Reading 260
Exit Burr Height, in.

65%

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

317/3-4

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-9.0	-10.0	-10.0	-8.0	-8.0	-8.0	8.0
#2	7.0	9.0	9.0	7.0	9.0	9.0	8.0
#3	8.0	12.0	12.0	7.0	12.0	12.0	9.0
#4	15.0	14.0	14.0	7.0	13.0	14.0	11.0
#5	12.0	10.0	13.0	11.0	12.0	12.0	10.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 22 Quality Variable SURFACE-ROUGHNESS-OVALITY
Specimen No. 4E2BC-3E4T MID. SPT. 125 RMS

Hole Manufacturing Conditions and Procedures: REAM UNDERSIZE REAMER 1.755 REAM MOD L.H. SPIRAL REAMER USE STRAIGHT FLUTE REAMER PLUNGE 1700 ... IN TRANSVERSE POS.

Spindle, rpm 80 Feed: [illegible]
Cutting Fluid: DRY Depth: (Ind. Reading) 2.440

Hole #1

Surface Finish, AA 100-110
Protrusion, in. 174
Perpendicularity, .001 in./in.
Longitudinal .0005 Transverse 0
Flush Gage Reading, in. -.001
Capacitance Gage Reading 359
Exit Burr Height, in.

Bluing Pin Rollout

65%

Air Gage Readings (.0001 in.)

Angular Position

318/324

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-7.0	-10.0	-8.0	-6.0	-5.0	-5.0	-5.0
#2	6.0	6.0	6.0	5.0	7.0	8.0	7.0
#3	8.0	12.0	12.0	7.0	12.0	13.0	10.0
#4	9.0	13.0	13.0	8.0	13.0	14.0	12.0
#5	13.0	11.0	13.0	10.0	13.0	11.0	12.0

Hole #2

Surface Finish, AA 100
Protrusion, in. 162
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse 0
Flush Gage Reading, in. 0
Capacitance Gage Reading 279
Exit Burr Height, in.

Bluing Pin Rollout

55%

Air Gage Readings (.0001 in.)

Angular Position

318/324

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-10.0	-9.0	-11.0	-11.0	-8.0	-8.0	-10.0
#2	5.0	6.0	5.0	4.0	6.0	7.0	5.0
#3	7.0	11.0	12.0	5.0	11.0	11.0	3.0
#4	9.0	13.0	13.0	5.0	12.0	13.0	10.0
#5	11.0	11.0	12.0	11.0	10.0	10.0	10.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 22 Quality Variable SURFACE ROUGHNESS - QUALITY
Specimen No. 2B53-665UL M.O.INT. 125 RMS

Hole Manufacturing Conditions and Procedures: REAM UNDER SIZE REAMER .1755 REAM MOD. L.H. SPIRAL REAMER USE STRAIGHT FLUTE REAMER PLUNGE .1720 ± .006 IN TRANSVERSE POS.

Spindle, rpm 80 Feed: SS 8 IPM
Cutting Fluid: DRY Depth: (Ind. Reading) .446

Hole #1

Surface Finish, AA 100 **Bluing Pin Rollout**
Protrusion, in. 185
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .0005
Flush Gage Reading, in. -.001
Capacitance Gage Reading 267
Exit Burr Height, in.

60%

Air Gage Readings (.0001 in.)

317/324

Axial Position	Angular Position 0°	45°	90°	180°	225°	270°	315°
Bottom #1	-9.0	-9.0	-8.0	-6.0	-7.0	-6.0	-8.0
#2	6.0	7.0	7.0	5.0	5.0	10.0	7.0
#3	7.0	12.0	12.0	4.0	11.0	13.0	12.0
#4	10.0	13.0	14.0	4.0	13.0	13.0	13.0
#5	13.0	11.0	13.0	10.0	13.0	12.0	13.0

Hole #2

Surface Finish, AA 125 **Bluing Pin Rollout**
Protrusion, in. 165
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse 0
Flush Gage Reading, in. -.001
Capacitance Gage Reading 245
Exit Burr Height, in.

65%

Air Gage Readings (.0001 in.)

317/324

Axial Position	Angular Position 0°	45°	90°	180°	225°	270°	315°
Bottom #1	-8.0	-7.0	-10.0	-8.0	-7.0	-8.0	-7.0
#2	7.0	[illegible]	8.0	8.0	7.0	9.0	7.0
#3	9.0	12.0	[illegible]	6.0	12.0	13.0	10.0
#4	10.0	14.0	14.0	5.0	13.0	14.0	13.0
#5	15.0	13.0	11.0	11.0	10.	11.0	15.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 22 Quality Variable SURFACE - ROUGHNESS - OVALITY
Specimen No. 6C6BC-6B2 TC MID. INT 125RMS

Hole Manufacturing Conditions and Procedures: REAM UNDER SIZE REAMER 1755 REAM MOD. L.H. SPIRAL REAMER USE STRAIGHT FLUTE REAMER DIVAGE 1900 ... IN ... POS.

Spindle, rpm 80 Feed: 5 E.I.P.M.
Cutting Fluid: DRY Depth: (Ind. Reading) 2.440

Hole #1

Surface Finish, AA 110
Protrusion, in. 180
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .001
Flush Gage Reading, in. -.003
Capacitance Gage Reading 250
Exit Burr Height, in.

Bluing Pin Rollout

60%

318
323

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-8.0	-5.0	-7.0	-5.0	-5.0	-6.0	-7.0
#2	6.0	6.0	6.0	5.0	7.0	9.0	8.0
#3	8.0	12.0	12.0	5.0	11.0	13.0	11.0
#4	11.0	14.0	13.0	5.0	13.0	12.0	13.0
#5	13.0	13.0	13.0	11.0	13.0	11.0	13.0

Hole #2

Surface Finish, AA 110
Protrusion, in. 177
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .0015
Flush Gage Reading, in. -.002
Capacitance Gage Reading 258
Exit Burr Height, in.

Bluing Pin Rollout

55%

317
323

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-5.0	-6.0	-7.0	-8.0	-5.0	-4.0	-4.0
#2	6.0	6.0	8.0	4.0	7.0	11.0	7.0
#3	8.0	12.0	13.0	6.0	11.0	14.0	13.0
#4	9.0	12.0	14.0	5.0	14.0	15.0	13.0
#5	11.0	13.0	13.0	12.0	15.0	15.0	14.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 12 Quality Variable SURFACE ROUGHNESS QUALITY
Specimen No. LC4BL3A5TC MIC Ent. 125R

Hole Manufacturing Conditions and Procedures: REAM UNDER-SIZE REAMER 1.755 REAM ... L.H. SPIRAL REAMER USE STRAIGHT FLUTE REAMER ... 1.76 ±.006 IN TRANSVERSE POS

Spindle, rpm 80 Feed: ...
Cutting Fluid: DRY Depth: (Ind. Reading) ≈.440

Hole #1

Surface Finish, AA 100
Protrusion, in. 160
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .002
Flush Gage Reading, in. .0001
Capacitance Gage Reading 254
Exit Burr Height, in.

Bluing Pin Rollout

65%

318/324

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-15.0	[illegible]	-14.0	-14.0	—	15.0	—
#2	3.0	3.0	4.0	2.0	4.0	5.0	3.0
#3	5.0	8.0	8.0	4.0	6.0	7.0	6.0
#4	6.0	8.0	10.0	5.0	8.0	8.0	6.0
#5	6.0	8.0	7.0	10.0	8.0	7.0	7.0

Hole #2

Surface Finish, AA 110
Protrusion, in. 173
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse 0
Flush Gage Reading, in. 0
Capacitance Gage Reading 258
Exit Burr Height, in.

Bluing Pin Rollout

70%

318/32[illegible]

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-14.0	-13.0	-15.0	-14.0	-14.0	-1[illegible].0	-14.0
#2	4.0	2.0	2.0	2.0	3.0	4.0	4.0
#3	4.0	6.0	7.0	4.0	5.0	7.0	6.0
#4	5.0	7.0	9.0	5.0	6.0	8.0	7.0
#5	6.0	7.0	8.0	6.0	7.0	8.0	8.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 22 Quality Variable SURFACE ROUGHNESS - QUALITY
Specimen No. 605BL L206TC MID INT 125RMS

Hole Manufacturing Conditions and Procedures: REAM UNDER-SIZE [illegible] REAM MOD. L.H. SPIRAL REAMER USE STRAIGHT FLUTE REAMER [illegible]

Spindle, rpm 80 Feed: [illegible]
Cutting Fluid: DRY Depth: (Ind. Reading) [illegible]

Hole #1

Surface Finish, AA 110
Protrusion, in. 165
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse .0025
Flush Gage Reading, in. -.001
Capacitance Gage Reading 254
Exit Burr Height, in.

Bluing Pin Rollout

75%

318 / 3[illegible]

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-14.0	-12.0	-14.0	-14.0	-13.0	-12.0	-15.0
#2	3.0	4.0	4.0	2.0	1.0	4.0	3.0
#3	5.0	7.0	7.0	3.0	6.0	7.0	6.0
#4	5.0	8.0	8.0	4.0	8.0	7.0	7.0
#5	5.0	8.0	8.0	5.0	7.0	7.0	7.0

Hole #2

Surface Finish, AA 90
Protrusion, in. 160
Perpendicularity, .001 in./in.
Longitudinal .0005 Transverse .001
Flush Gage Reading, in. -.001
Capacitance Gage Reading 250
Exit Burr Height, in.

Bluing Pin Rollout

70%

31[illegible] / [illegible]4

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-14.0	-13.0	-13.0	-15.0	-1[illegible]	-14.0	-15.0
#2	3.0	4.0	4.0	2.0	1.0	5.0	3.0
#3	4.0	7.0	7.0	5.0	6.0	8.0	5.0
#4	6.0	[illegible]	9.0	5.0	7.0	8.0	6.0
#5	6.0	[illegible]	8.0	5.0	7.0	8.0	7.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 22 Quality Variable SURFACE ROUGHNESS-QUALITY
Specimen No. 3B1BCL 4E3B3C M.O. INT. 125 RMS

Hole Manufacturing Conditions and Procedures: REAM UNDER-SIZE REAMER 1.255 REAM W/ L.H. SPIRAL REAMER USE STRAIGHT-FLUTE REAMER PLUNGE 1.200 [illegible] IN TRANSITION [illegible]

Spindle, rpm 80 Feed: [illegible]
Cutting Fluid: DRY Depth: (Ind. Reading) 2.440

Hole #1

Surface Finish, AA 100
Protrusion, in. 172
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse .0015
Flush Gage Reading, in. -.002
Capacitance Gage Reading 248
Exit Burr Height, in.

Bluing Pin Rollout

25%

Air Gage Readings (.0001 in.)

318/325

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-13.0	-13.0	-14.0	-14.0	-15.0	-14.0	-13.0
#2	4.0	4.0	4.0	3.0	[illegible]	4.0	4.0
#3	5.0	7.0	8.0	4.0	[illegible]	8.0	5.0
#4	6.0	8.0	8.0	4.0	[illegible]	8.0	7.0
#5	6.0	8.0	8.0	5.0	8.0	9.0	8.0

Hole #2

Surface Finish, AA 100
Protrusion, in. 171
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse 0
Flush Gage Reading, in. 0
Capacitance Gage Reading 238
Exit Burr Height, in.

Bluing Pin Rollout

65%

Air Gage Readings (.0001 in.)

317/325

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-14.0	-14.0	-15.0	-14.0	-14.0	-12.0	-13.0
#2	3.0	5.0	5.0	2.0	1.0	5.0	4.0
#3	4.0	8.0	8.0	4.0	6.0	8.0	7.0
#4	5.0	9.0	10.0	6.0	7.0	9.0	8.0
#5	7.0	9.0	9.0	6.0	7.0	8.0	8.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 22 Quality Variable SURFACE ROUGHNESS · QUALITY
Specimen No. 4C6BC6 2C2BC M.D. INT. 125 RMS

Hole Manufacturing Conditions and Procedures: REAM UNDERSIZE REAMER 1.755 REAM [illegible] L.H. SPIRAL [illegible] USE SPB [illegible] FLUTE REAMER [illegible] 1.200 ±.006 IN TRANSVERSE [illegible]

Spindle, rpm 80 Feed: [illegible]
Cutting Fluid: DRY Depth: (Ind. Reading) 2442

Hole #1

Surface Finish, AA 105
Protrusion, in. 162
Perpendicularity, .001 in./in.
Longitudinal 0 Transverse 0
Flush Gage Reading, in. .002
Capacitance Gage Reading 255
Exit Burr Height, in.

Bluing Pin Rollout

60%

317/323

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-13.0	-12.0	-12.0	-14.0	-15.0	-15.0	-15.0
#2	3.0	4.0	4.0	2.0	3.0	4.0	3.0
#3	6.0	7.0	8.0	4.0	7.0	7.0	7.0
#4	6.0	8.0	9.0	5.0	7.0	8.0	7.0
#5	6.0	9.0	8.0	6.0	7.0	8.0	7.0

Hole #2

Surface Finish, AA 100
Protrusion, in. 168
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .001
Flush Gage Reading, in. 0
Capacitance Gage Reading 252
Exit Burr Height, in.

Bluing Pin Rollout

65%

318/324

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-14.0	-14.0	—	-15.0	-13.0	-13.0	-13.0
#2	3.0	4.0	4.0	3.0	2.0	5.0	4.0
#3	5.0	6.0	7.0	4.0	6.0	8.0	7.0
#4	6.0	7.0	8.0	5.0	8.0	9.0	7.0
#5	5.0	8.0	9.0	6.0	7.0	9.0	8.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 22 Quality Variable SURFACE ROUGHNESS-QUALITY
Specimen No. 4BL[illegible]4C4BC M.D. INT. 125 RMS.

Hole Manufacturing Conditions and Procedures: REAM UNDER SIZE REAMER 1.755 [illegible] L.H. SPIRAL REAMER USE STRAIGHT FLUTE REAM [illegible] 1.770 [illegible] IN [illegible] POS.

Spindle, rpm 80 Feed: [illegible]
Cutting Fluid: DRY Depth: (Ind. Reading) 2.440

Hole #1

Surface Finish, AA 90
Protrusion, in. 160
Perpendicularity, .001 in./in.
Longitudinal .0005 Transverse 0
Flush Gage Reading, in. -.001
Capacitance Gage Reading 229
Exit Burr Height, in.

Bluing Pin Rollout

65%

318
524

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-7.0	-7.0	-5.0	-2.0	-5.0	-7.0	-6.0
#2	0	4.0	8.0	3.0	-2.0	1.0	-2.0
#3	4.0	9.0	11.0	2.0	5.0	8.0	[illegible]
#4	6.0	11.0	12.0	6.0	9.0	10.0	10.0
#5	11.0	12.0	12.0	12.0	11.0	13.0	11.0

Hole #2

Surface Finish, AA 90
Protrusion, in. 174
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .001
Flush Gage Reading, in. 0
Capacitance Gage Reading 278
Exit Burr Height, in.

Bluing Pin Rollout

60%

318
523

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-5.0	-7.0	-9.0	-13.0	-13.0	-13.0	-14.0
#2	0	1.0	0	3.0	4.0	5.0	3.0
#3	[illegible]	5.0	2.0	4.0	8.0	8.0	6.0
#4	[illegible]	9.0	10.0	5.0	8.0	9.0	[illegible]
#5	10.0	11.0	11.0	5.0	9.0	8.0	[illegible]

INSPECTION SHEETS FOR TEST SERIES 23

COMBINED VARIABLES

MANUFACTURING REPORT: TAPERED HOLES

Test Series 23 Quality Variable SURFACE RGH., 125RMS, MIDINT.
Specimen No. 3A2TC & 305TC

Hole Manufacturing Conditions and Procedures: REAM UNDERSIZED REAMER 1.755 REAM MOD. L.H. SPIRAL REAMER

Spindle, rpm 80 Feed: 5.8 IPM
Cutting Fluid: DRY Depth: (Ind. Reading) 2.440

Hole #1

Surface Finish, AA 95-100
Protrusion, in. .165
Perpendicularity, .001 in./in.
Longitudinal .0005 Transverse .0005
Flush Gage Reading, in. .0000
Capacitance Gage Reading 302
Exit Burr Height, in.

Bluing Pin Rollout

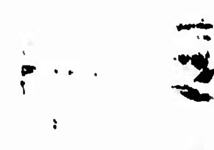
Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-10.0	-13.0	-14.0	-13.0	-12.0	-11.0	-12.0
#2	1.0	1.0	0	2.0	2.0	1.0	1.0
#3	2.0	2.0	2.0	3.0	3.0	3.0	2.0
#4	2.0	2.0	2.0	3.0	3.0	3.0	1.0
#5	3.0	4.0	4.0	4.0	5.0	4.0	5.0

Hole #2

Surface Finish, AA 100-125
Protrusion, in. .171
Perpendicularity, .001 in./in.
Longitudinal .0005 Transverse .0010
Flush Gage Reading, in. -.0020
Capacitance Gage Reading 304
Exit Burr Height, in.

Bluing Pin Rollout



Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-12.0	-14.0	-12.0	-12.0	-13.0	-15.0	-14.0
#2	1.0	1.0	1.0	1.0	1.0	0	1.0
#3	3.0	2.0	2.0	2.0	2.0	2.0	2.0
#4	2.0	2.0	2.0	1.0	0	1.0	2.0
#5	5.0	4.0	4.0	5.0	4.0	3.0	4.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 23 Quality Variable SURFACE RGH. 125 RMS, MID. INT.
Specimen No. 2B6TC & 3C5TC

Hole Manufacturing Conditions and Procedures: REAM UNDERSIZED REAMER
1.755 REAM MOD. L.H. SPIRAL REAMER

Spindle, rpm 80 Feed: 55.8 IPM
Cutting Fluid: DRY Depth: (Ind. Reading) 2.440

Hole #1

Surface Finish, AA 100-125
Protrusion, in. .179
Perpendicularity, .001 in./in.
Longitudinal .0005 Transverse .0005
Flush Gage Reading, in. 0
Capacitance Gage Reading 298
Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-14.0	-12.0	-12.0	-9.0	-9.0	-10.0	-13.0
#2	0	0	2.0	1.0	1.0	2.0	1.0
#3	2.0	2.0	2.0	1.0	2.0	3.0	3.0
#4	2.0	2.0	0	2.0	2.0	2.0	3.0
#5	3.0	5.0	4.0	5.0	5.0	5.0	5.0

Hole #2

Surface Finish, AA 95-100
Protrusion, in. .165
Perpendicularity, .001 in./in.
Longitudinal .0010 Transverse .0005
Flush Gage Reading, in. -.002
Capacitance Gage Reading 339
Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-15.0	-14.0	-14.0	-13.0	-13.0	-14.0	-15.0
#2	2.0	2.0	3.0	2.0	2.0	2.0	2.0
#3	2.0	3.0	2.0	2.0	2.0	2.0	2.0
#4	1.0	2.0	0	0	0	0	1.0
#5	2.0	2.0	2.0	0	0	1.0	2.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 23 Quality Variable SURF. RGH. 125 RMS MID. INT.
Specimen No. 3D1TC & 3BCTC

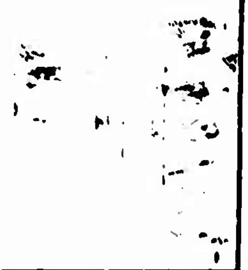
Hole Manufacturing Conditions and Procedures: REAM UNDERSIZE REAMER
1.755 REAM MOD. L.H. SPIRAL REAMER

Spindle, rpm 80 Feed: 33 81 I.P.M.
Cutting Fluid: DRY Depth: (Ind. Reading) 2.440

Hole #1

Surface Finish, AA 95-100
Protrusion, in. .177
Perpendicularity, .001 in./in.
Longitudinal .0015 Transverse .0005
Flush Gage Reading, in. -.003
Capacitance Gage Reading 294
Exit Burr Height, in.

Bluing Pin Rollout



Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-10.0	-11.0	-13.0	-14.0	-12.0	-9.0	-10.0
#2	2.0	2.0	1.0	1.0	2.0	2.0	2.0
#3	3.0	3.0	3.0	1.0	2.0	2.0	2.0
#4	3.0	3.0	3.0	2.0	0	1.0	2.0
#5	4.0	5.0	5.0	4.0	4.0	3.0	4.0

Hole #2

Surface Finish, AA 100-125
Protrusion, in. .160
Perpendicularity, .001 in./in.
Longitudinal .0000 Transverse .0000
Flush Gage Reading, in. +.002
Capacitance Gage Reading 391
Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-13.0	-13.0	-14.0	-10.0	-12.0	-12.0	-11.0
#2	0	0	0	0	0	0	0
#3	1.0	1.0	0	0	0	0	0
#4	1.0	0	0	-1.0	-1.0	-1.0	-1.0
#5	0	0	-1.0	-1.0	0	-1.0	-1.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 23 Quality Variable SURFACE ROUGHNESS 125 RMS
Specimen No. 3EST£4B38C MID INTERFERENCE

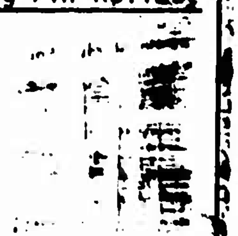
Hole Manufacturing Conditions and Procedures: REAM UNDERSIZE REAMER
.755 REAM MOD. L.H. SPIRAL REAMER

Spindle, rpm 80 Feed: 80 BLPM.
Cutting Fluid: DRY Depth: (Ind. Reading) 2.440

Hole #1

Surface Finish, AA 95-105
Protrusion, in. .176
Perpendicularity, .001 in./in.
Longitudinal .001 Transverse .0005
Flush Gage Reading, in. -.003
Capacitance Gage Reading 308
Exit Burr Height, in.

Bluing Pin Rollout



Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-14.0	-14.0	-15.0	-14.0	-15.0	-15.0	-14.0
#2	1.0	1.0	0	0	0	1.0	1.0
#3	3.0	2.0	1.0	1.0	2.0	2.0	2.0
#4	2.0	2.0	0	0	2.0	2.0	2.0
#5	3.0	3.0	2.0	3.0	3.0	1.0	3.0

Hole #2

Surface Finish, AA 90-100
Protrusion, in. .165
Perpendicularity, .001 in./in.
Longitudinal .0005 Transverse .0015
Flush Gage Reading, in. -.001
Capacitance Gage Reading 299
Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-14.0	-15.0	-15.0	-15.0	-15.0	-15.0	-15.0
#2	1.0	0	0	0	0	0	1.0
#3	3.0	3.0	3.0	2.0	2.0	2.0	3.0
#4	3.0	3.0	2.0	1.0	1.0	1.0	3.0
#5	3.0	2.0	2.0	3.0	3.0	3.0	2.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 23 Quality Variable SURFACE ROUGHNESS 125 RMS
Specimen No. 2A6BC&6BITC MID. INT.

Hole Manufacturing Conditions and Procedures: REAM UNDERSIZE REAMER
1.755 REAM MOD. L.H. SPIRAL REAMER

Spindle, rpm 80 Feed: 53.81 IPM.
Cutting Fluid: DRY Depth: (Ind. Reading) 2.440

Hole #1

Surface Finish, AA 95-100
Protrusion, in. .178
Perpendicularity, .001 in./in.
Longitudinal .0005 Transverse .0005
Flush Gage Reading, in. -.001
Capacitance Gage Reading 280
Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-15.0	-15.0	-15.0	-14.0	-15.0	-15.0	-15.0
#2	0	1.0	1.0	1.0	1.0	1.0	1.0
#3	2.0	2.0	3.0	3.0	2.0	3.0	2.0
#4	2.0	2.0	3.0	3.0	1.0	2.0	2.0
#5	2.0	2.0	3.0	4.0	5.0	4.0	4.0

Hole #2

Surface Finish, AA 100-110
Protrusion, in. .177
Perpendicularity, .001 in./in.
Longitudinal .0005 Transverse .001
Flush Gage Reading, in. 0
Capacitance Gage Reading 313
Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-14.0	-15.0	-15.0	-14.0	-14.0	-13.0	-15.0
#2	0	1.0	1.0	1.0	1.0	2.0	0
#3	3.0	2.0	2.0	1.0	1.0	2.0	2.0
#4	3.0	2.0	0	0	1.0	2.0	2.0
#5	4.0	2.0	1.0	4.0	4.0	4.0	3.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 23 Quality Variable SURFACE ROUGHNESS-RIFLING MID. INT. 125 RMS
Specimen No. 4E2TC & 3E4BC

Hole Manufacturing Conditions and Procedures: REAM UNDERSIZE REAMER 1.755 MOD. L.H. SPIRAL REAMER. USING MOD. L.H. SPIRAL REAMER "PUSH IN" .400-.500 DEEP, NO RPM.

Spindle, rpm 80 Feed: 5.5 SIPM
Cutting Fluid: DRY Depth: (Ind. Reading) 2.440

Hole #1

Surface Finish, AA 95-100
Protrusion, in. .172
Perpendicularity, .001 in./in.
Longitudinal .0010 Transverse .0005
Flush Gage Reading, in. -.002
Capacitance Gage Reading 332
Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-15.0	-15.0	-13.0	-15.0	-15.0	-15.0	-14.0
#2	1.0	0	1.0	1.0	1.0	1.0	2.0
#3	3.0	3.0	2.0	2.0	2.0	2.0	3.0
#4	2.0	2.0	1.0	0	0	0	1.0
#5	2.0	2.0	0	0	1.0	1.0	2.0

Hole #2

Surface Finish, AA 100-125
Protrusion, in. .173
Perpendicularity, .001 in./in.
Longitudinal .0005 Transverse .0010
Flush Gage Reading, in. -.002.0
Capacitance Gage Reading 279
Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-15.0	-13.0	-15.0	-14.0	-13.0	-15.0	-13.0
#2	1.0	2.0	2.0	1.0	1.0	1.0	2.0
#3	2.0	3.0	4.0	2.0	2.0	2.0	2.0
#4	3.0	3.0	3.0	1.0	2.0	2.0	2.0
#5	4.0	2.0	3.0	2.0	1.0	2.0	1.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 23 Quality Variable SURFACE ROUGHNESS - RIFLING MID. INT. 125 RMS
Specimen No. 3E1B & 2A2BC

Hole Manufacturing Conditions and Procedures: REAM UNDERSIZE REAMER 1.755 REAM MOD. L.H. SPIRAL REAMER USING MOD. L.H. SPIRAL REAMER "PUSH IN" .400-.500 DEEP, NO R.P.M.

Spindle, rpm 80 Feed: 33.8 IPM
Cutting Fluid: DRY Depth: (Ind. Reading) 2.440

Hole #1

Surface Finish, AA 100-125
Protrusion, in. .170
Perpendicularity, .001 in./in.
Longitudinal .0010 Transverse .0010
Flush Gage Reading, in. -.0050
Capacitance Gage Reading 357
Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-15.0	-15.0	-15.0	-15.0	-14.0	-14.0	-15.0
#2	1.0	1.0	0	0	1.0	1.0	0
#3	2.0	2.0	2.0	1.0	2.0	3.0	2.0
#4	1.0	1.0	1.0	0	1.0	2.0	0
#5	1.0	1.0	1.0	2.0	1.0	2.0	0

Hole #2

Surface Finish, AA 100-125
Protrusion, in. .174
Perpendicularity, .001 in./in.
Longitudinal .0015 Transverse .0015
Flush Gage Reading, in. -.0020
Capacitance Gage Reading 312
Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-13.0	-12.0	-13.0	-13.0	-14.0	-12.0	-15.0
#2	1.0	0	2.0	1.0	1.0	2.0	1.0
#3	3.0	2.0	4.0	1.0	2.0	4.0	2.0
#4	3.0	2.0	3.0	3.0	2.0	4.0	1.0
#5	5.0	5.0	4.0	4.0	4.0	3.0	3.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 23 Quality Variable SURFACE ROUGHNESS-RIFLING MID. INT. 125 RMS
Specimen No. 6BGB 23C3T

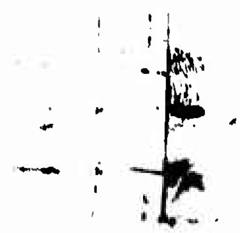
Hole Manufacturing Conditions and Procedures: REAM UNDERSIZED REAMER .1755 REAM MOD. L.H. SPIRAL REAMER, USING MOD. L.H. SPIRAL REAMER "PUSH IN", .400-.500 NO R.P.M.

Spindle, rpm 80 Feed: 33.6 IPM
Cutting Fluid: DRY Depth: (Ind. Reading) 2.440

Hole #1

Surface Finish, AA 95-100
Protrusion, in. .158
Perpendicularity, .001 in./in.
Longitudinal .0015 Transverse .0010
Flush Gage Reading, in. -.002
Capacitance Gage Reading 335
Exit Burr Height, in.

Bluing Pin Rollout



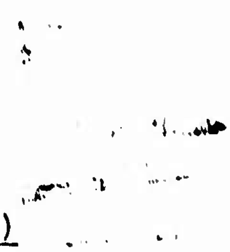
Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-13.0	-14.0	-15.0	-15.0	-14.0	-15.0	-15.0
#2	0	0	1.0	1.0	2.0	0	0
#3	2.0	2.0	2.0	3.0	3.0	2.0	2.0
#4	1.0	1.0	1.0	1.0	1.0	2.0	0
#5	1.0	0	0	1.0	0	2.0	0

Hole #2

Surface Finish, AA 95-100
Protrusion, in. .167
Perpendicularity, .001 in./in.
Longitudinal .0010 Transverse .0010
Flush Gage Reading, in. -.002
Capacitance Gage Reading 332
Exit Burr Height, in.

Bluing Pin Rollout



Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-15.0	-11.0	-14.0	-15.0	-15.0	-13.0	-15.0
#2	0	1.0	2.0	2.0	1.0	2.0	0
#3	2.0	3.0	4.0	2.0	2.0	4.0	3.0
#4	1.0	2.0	2.0	1.0	1.0	3.0	2.0
#5	1.0	1.0	1.0	0	1.0	1.0	1.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 23 Quality Variable SURFACE ROUGHNESS - RIFLING MID. INT. 125 RMS
Specimen No. 3E2TC & 4E6TC

Hole Manufacturing Conditions and Procedures: REAM UNDERSIZE REAMER 1.755 REAM MOD. L.H. SPIRAL REAMER, USE MOD L.H. SPIRAL REAMER "PUSH IN" .400-.500 NO R.P.M.

Spindle, rpm 80 Feed: 35 BIPM.
Cutting Fluid: DRY Depth: (Ind. Reading) 2.440

Hole #1

Surface Finish, AA 95-100
Protrusion, in. .170
Perpendicularity, .001 in./in.
Longitudinal .0005 Transverse .0005
Flush Gage Reading, in. .0000
Capacitance Gage Reading 337
Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-14.0	-15.0	-15.0	-15.0	-15.0	-14.0	-15.0
#2	0	0	2.0	0	1.0	1.0	1.0
#3	0	2.0	3.0	1.0	1.0	2.0	2.0
#4	1.0	2.0	3.0	0	1.0	1.0	1.0
#5	2.0	2.0	2.0	1.0	1.0	1.0	1.0

Hole #2

Surface Finish, AA 95-100
Protrusion, in. .168
Perpendicularity, .001 in./in.
Longitudinal .0005 Transverse .0005
Flush Gage Reading, in. .0000
Capacitance Gage Reading 308
Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-15.0	-14.0	-14.0	-15.0	-14.0	-15.0	-15.0
#2	1.0	1.0	2.0	0	1.0	0	1.0
#3	2.0	3.0	3.0	1.0	2.0	1.0	2.0
#4	2.0	3.0	3.0	0	1.0	2.0	0
#5	1.0	2.0	1.0	0	1.0	3.0	1.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 23 Quality Variable SURFACE ROUGHNESS - RIFLING MID. INT. 125 RMS
Specimen No. 2E5TC 14E1BC

Hole Manufacturing Conditions and Procedures: REAM UNDERSIZE REAMER 1.755 REAM MOD L.H. SPIRAL REAMER USE MOD L.H. SPIRAL REAMER "PUSH IN" 400-500 NO R.P.M.

Spindle, rpm 80 Feed: 55 IPM.
Cutting Fluid: DRY Depth: (Ind. Reading) 2.440

Hole #1

Surface Finish, AA ______
Protrusion, in. .160
Perpendicularity, .001 in./in.
Longitudinal .0005 Transverse .0005
Flush Gage Reading, in. +.003
Capacitance Gage Reading 324
Exit Burr Height, in. ______

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-15.0	-13.0	-9.0	-13.0	-12.0	-12.0	-14.0
#2	0	1.0	2.0	1.0	1.0	2.0	1.0
#3	1.0	2.0	4.0	1.0	2.0	4.0	2.0
#4	1.0	2.0	3.0	0	0	3.0	0
#5	1.0	1.0	2.0	0	0	3.0	1.0

Hole #2

Surface Finish, AA ______
Protrusion, in. .170
Perpendicularity, .001 in./in.
Longitudinal .0005 Transverse .0000
Flush Gage Reading, in. +.0005
Capacitance Gage Reading 319
Exit Burr Height, in. ______

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-15.0	-15.0	-14.0	-15.0	-15.0	-15.	-15.0
#2	0	0	1.0	0	2.0	2.0	2.0
#3	1.0	1.0	3.0	2.	2.0	4.0	2.0
#4	1.0	2	3.0	0	0	4.0	2.0
#5	1.0	2	3.0	0	0	3.0	2.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 23 Quality Variable SURF. RGH., BARRELLING
Specimen No. ______

Hole Manufacturing Conditions and Procedures: REAM UNDERSIZE REAMER TO 1.755 DEPTH, MOD. LH. SPIRAL REAMER, USE BORING TOOL TO .645 DEEP

Spindle, rpm 80 Feed: 558 IPM
Cutting Fluid: DRY Depth: (Ind. Reading) 2.390

Hole #1

Surface Finish, AA 100-125
Protrusion, in. .180
Perpendicularity, .001 in./in.
Longitudinal .0000 Transverse .0000
Flush Gage Reading, in. .0000
Capacitance Gage Reading 262
Exit Burr Height, in. ______

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

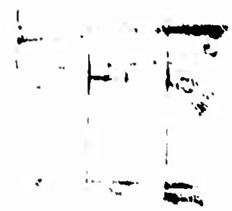
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-10.0	-10.0	-10.0	-10.0	-11.0	-10.0	-9.0
#2	6.0	5.0	5.0	3.0	5.0	4.0	5.0
#3	5.0	5.0	5.0	5.0	5.0	5.0	6.0
#4	4.0	4.0	4.0	2.0	2.0	4.0	4.0
#5	3.0	4.0	4.0	2.0	2.0	3.0	3.0

Hole #2

Surface Finish, AA 95-100
Protrusion, in. .185
Perpendicularity, .001 in./in.
Longitudinal .0005 Transverse .0005
Flush Gage Reading, in. .0000
Capacitance Gage Reading 289
Exit Burr Height, in. ______

Bluing Pin Rollout



Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-11.0	-11.0	-11.0	-11.0	-11.0	-11.0	-11.0
#2	5.0	4.0	4.0	5.0	5.0	5.0	4.0
#3	5.0	5.0	5.0	5.0	5.0	6.0	6.0
#4	4.0	3.0	2.0	2.0	4.0	4.0	4.0
#5	0	0	0	0	1.0	0	1.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 23 Quality Variable SURF. RGH.-BARRELLING MID. INT. 125RMS
Specimen No. 2D4BC¢3D2TC

Hole Manufacturing Conditions and Procedures: REAM UNDERSIZE REAMER 1.755, REAM MOD. LH SPIRAL REAMER, USE BORING TOOL, BORE TO DEPTH .645

Spindle, rpm 80 Feed: 3.8 IPM
Cutting Fluid: DRY Depth: (Ind. Reading) 2.430

Hole #1

Surface Finish, AA 100-120
Protrusion, in. .160
Perpendicularity, .001 in./in.
Longitudinal .0000 Transverse .0000
Flush Gage Reading, in. .0000
Capacitance Gage Reading 223
Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-10.0	-10.0	-11.0	-10.0	-10.0	-9.0	-10.0
#2	4.0	3.0	3.0	4.0	5.0	5.0	6.0
#3	6.0	6.0	6.0	6.0	6.0	6.0	7.0
#4	6.0	6.0	5.0	5.0	5.0	5.0	6.0
#5	4.0	5.0	3.0	3.0	5.0	5.0	4.0

Hole #2

Surface Finish, AA 110-125
Protrusion, in. .180
Perpendicularity, .001 in./in.
Longitudinal .0000 Transverse .0000
Flush Gage Reading, in. .0000
Capacitance Gage Reading 262
Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-10.0	-11.0	-10.0	-11.0	-11.0	-10.0	-11.0
#2	4.0	4.0	3.0	3.0	4.0	3.0	5.0
#3	5.0	5.0	5.0	4.0	4.0	5.0	5.0
#4	4.0	4.0	2.0	3.0	2.0	3.0	3.0
#5	2.0	2.0	3.0	2.0	3.0	2.0	2.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 23 Quality Variable SURF. RGH.-BARRELLING MID. INT. 125 RMS.
Specimen No. 2A1TC 16C5T

Hole Manufacturing Conditions and Procedures: REAM UNDERSIZE REAMER 1.735, REAM MOD. LH SPIRAL REAMER, USE BORING TOOL, TO DEPTH .645

Spindle, rpm 80 Feed: 53 81PM
Cutting Fluid: DRY Depth: (Ind. Reading) 2.390

Hole #1

Surface Finish, AA 95-100
Protrusion, in. .175
Perpendicularity, .001 in./in.
Longitudinal .0010 Transverse .0000
Flush Gage Reading, in. .0000
Capacitance Gage Reading 280
Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-11.0	-10.0	-11.0	-11.0	-10.0	-11.0	-11.0
#2	4.0	5.0	3.0	4.0	5.0	5.0	5.0
#3	5.0	5.0	5.0	5.0	5.0	6.0	5.0
#4	3.0	3.0	3.0	3.0	3.0	4.0	4.0
#5	0	0	0	0	0	0	0

Hole #2

Surface Finish, AA 95-100
Protrusion, in. .180
Perpendicularity, .001 in./in.
Longitudinal .0005 Transverse .0000
Flush Gage Reading, in. -.0020
Capacitance Gage Reading 207
Exit Burr Height, in.

Bluing Pin Rollout

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-11.0	-11.0	-12.0	-11.0	-11.0	-11.0	-11.0
#2	5.0	5.0	5.0	4.0	5.0	6.0	4.0
#3	6.0	5.0	5.0	5.0	6.0	6.0	6.0
#4	5.0	5.0	4.0	3.0	5.0	5.0	3.0
#5	3.0	3.0	5.0	3.0	3.0	3.0	4.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 23 Quality Variable SURF. RGH. BARRELLING
Specimen No. 6D2T & 6B4B

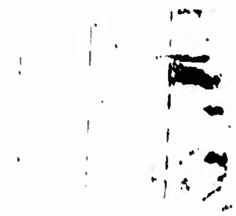
Hole Manufacturing Conditions and Procedures: REAM UNDERSIZE REAMER 1.755, MOD. L.H. SPIRAL REAMER, USE BORING TOOL TO .645 DEEP

Spindle, rpm 80 Feed: 35 B IPM
Cutting Fluid: DRY Depth: (Ind. Reading) 2.390

Hole #1

Surface Finish, AA 95-100
Protrusion, in. .170
Perpendicularity, .001 in./in.
Longitudinal .0000 Transverse .0000
Flush Gage Reading, in. -.0002
Capacitance Gage Reading 263
Exit Burr Height, in.

Bluing Pin Rollout



Air Gage Readings (.0001 in.)

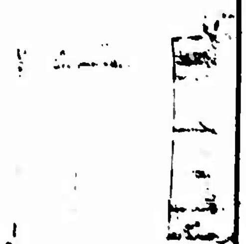
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-12.0	-12.0	-12.0	-12.0	-12.0	-12.0	-12.0
#2	5.0	5.0	3.0	5.0	5.0	5.0	5.0
#3	5.0	4.0	4.0	5.0	5.0	5.0	3.0
#4	3.0	4.0	2.0	1.0	3.0	4.0	3.0
#5	0	0	0	0	0	0	0

Hole #2

Surface Finish, AA 95-120
Protrusion, in. .165
Perpendicularity, .001 in./in.
Longitudinal .0010 Transverse .0010
Flush Gage Reading, in. .0000
Capacitance Gage Reading 268
Exit Burr Height, in.

Bluing Pin Rollout



Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-11.0	-10.0	-11.0	-11.0	-11.0	-11.0	-11.0
#2	5.0	4.0	4.0	4.0	3.0	5.0	5.0
#3	5.0	4.0	5.0	5.0	5.0	5.0	5.0
#4	2.0	2.0	1.0	3.0	3.0	2.0	3.0
#5	0	0	0	0	0	0	0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 23 Quality Variable SURF. RGH. -BARRELLING
Specimen No. 6C6T & 6D5B

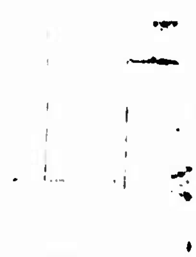
Hole Manufacturing Conditions and Procedures: REAM UNDERSIZE REAMER TO 1.755 DEPTH MOD. L.H. SPIRAL REAMER, USE BORING TO .645 DP.

Spindle, rpm 80 Feed: 3.381PM
Cutting Fluid: DRY Depth: (Ind. Reading) 2.390

Hole #1

Surface Finish, AA 95-100
Protrusion, in. .190
Perpendicularity, .001 in./in.
Longitudinal .0010 Transverse .0005
Flush Gage Reading, in. .0000
Capacitance Gage Reading 292
Exit Burr Height, in.

Bluing Pin Rollout



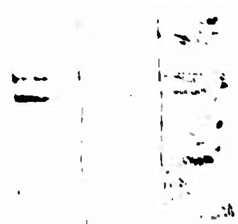
Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-12.0	-11.0	-11.0	-11.0	-11.0	-10.0	-11.0
#2	5.0	4.0	5.0	3.0	5.0	5.0	4.0
#3	5.0	4.0	5.0	5.0	5.0	6.0	5.0
#4	3.0	1.0	1.0	2.0	2.0	4.0	3.0
#5	2.0	3.0	2.0	5.0	3.0	3.0	2.0

Hole #2

Surface Finish, AA 90-95
Protrusion, in. .180
Perpendicularity, .001 in./in.
Longitudinal .0005 Transverse .0005
Flush Gage Reading, in. .0000
Capacitance Gage Reading 250
Exit Burr Height, in.

Bluing Pin Rollout



Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	-11.0	-11.0	-10.0	-10.0	-11.0	-11.0	-11.0
#2	5.0	5.0	4.0	5.0	3.0	4.0	5.0
#3	5.0	5.0	5.0	6.0	5.0	5.0	5.0
#4	3.0	3.0	3.0	5.0	4.0	4.0	5.0
#5	3.0	2.0	2.0	2.0	3.0	4.0	4.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 23 Quality Variable SURF. RGH. OVALITY MID. INT.
Specimen No. 3D4TC & 3A6BC

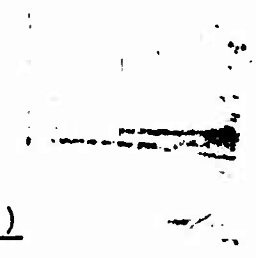
Hole Manufacturing Conditions and Procedures: REAM UNDERSIZE REAMER 1.755 DR REAM MOD. L.H. SPIRAL REAMER, USE STR. FLUTE REAMER PLUNGE 1.700 +/-.006 IN TRANSVERSE POS.

Spindle, rpm 80 Feed: 33.8 IPM
Cutting Fluid: DRY Depth: (Ind. Reading) 2.400

Hole #1

Surface Finish, AA 95-100
Protrusion, in. .180
Perpendicularity, .001 in./in.
Longitudinal .0010 Transverse .0005
Flush Gage Reading, in. -.003
Capacitance Gage Reading 288
Exit Burr Height, in.

Bluing Pin Rollout



.318/.321

Air Gage Readings (.0001 in.)

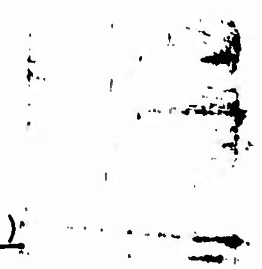
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	—	—	—	—	—	—	—
#2	1.0	2.0	3.0	1.0	1.0	1.0	2.0
#3	3.0	6.0	6.0	3.0	4.0	6.0	5.0
#4	4.0	7.0	7.0	3.0	5.0	6.0	6.0
#5	5.0	6.0	6.0	3.0	4.0	5.0	6.0

Hole #2

Surface Finish, AA 90-100
Protrusion, in. .175
Perpendicularity, .001 in./in.
Longitudinal .0005 Transverse .0010
Flush Gage Reading, in. -.003
Capacitance Gage Reading 295
Exit Burr Height, in.

Bluing Pin Rollout



.317/.324

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	—	—	—	—	—	—	—
#2	1.0	2.0	3.0	0	3.0	2.0	2.0
#3	3.0	5.0	6.0	1.0	4.0	5.0	5.0
#4	4.0	7.0	8.0	1.0	5.0	7.0	6.0
#5	3.0	6.0	7.0	2.0	5.0	5.0	5.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 23 Quality Variable SURF. RGH. OVALITY MID. INT.
Specimen No. 4D6TC & 2C3TC

Hole Manufacturing Conditions and Procedures: REAM UNDERSIZE REAMER 1.755 DP., REAM MOD. L.H. SPIRAL REAMER, USE STR. FLUTE REAMER PLUNGE 1.700 +/- .006 IN TRANSVERSE POS.

Spindle, rpm 80 Feed: 30 BIPM
Cutting Fluid: DRY Depth: (Ind. Reading) 2.400

Hole #1

Surface Finish, AA 95-100
Protrusion, in. .175
Perpendicularity, .001 in./in.
Longitudinal .0000 Transverse .0005
Flush Gage Reading, in. .000
Capacitance Gage Reading 287
Exit Burr Height, in.

Bluing Pin Rollout

.317
.323

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	—	—	—	—	—	—	—
#2	1.0	2.0	3.0	0	1.0	3.0	2.0
#3	4.0	5.0	8.0	2.0	5.0	6.0	6.0
#4	5.0	5.0	7.0	2.0	6.0	7.0	7.0
#5	4.0	6.0	6.0	3.0	6.0	6.0	5.0

Hole #2

Surface Finish, AA 95-100
Protrusion, in. .175
Perpendicularity, .001 in./in.
Longitudinal .0000 Transverse .0010
Flush Gage Reading, in. .000
Capacitance Gage Reading 309
Exit Burr Height, in.

Bluing Pin Rollout

.317
.322

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	—	—	—	—	—	—	-15.0
#2	0	0	2.0	0	1.0	1.0	3.0
#3	2.0	5.0	6.0	1.0	4.0	5.0	6.0
#4	2.0	6.0	6.0	1.0	5.0	7.0	8.0
#5	2.0	5.0	6.0	3.0	5.0	5.0	6.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 23 Quality Variable SURF. RGH. OVALITY
Specimen No. 6D1BC & 3E5TC MID. INT.

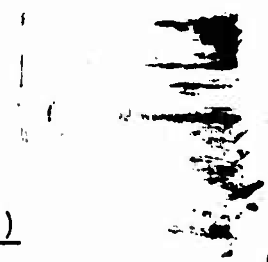
Hole Manufacturing Conditions and Procedures: REAM UNDERSIZE REAMER 1.755 DP, REAM MOD. LH. SPIRAL REAMER, USE STR. FLUTE REAMER PLUNGE 1.700 +/- .006 IN TRANSVERSE POS.

Spindle, rpm 80 Feed: 55 SIPM
Cutting Fluid: DRY Depth: (Ind. Reading) 2.400

Hole #1

Surface Finish, AA 95-100
Protrusion, in. .175
Perpendicularity, .001 in./in.
Longitudinal .0015 Transverse .0005
Flush Gage Reading, in. -.001
Capacitance Gage Reading 256
Exit Burr Height, in.

Bluing Pin Rollout



.316
.323

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	—	—	—	—	—	—	—
#2	0	0	1.0	0	2.0	4.0	1.0
#3	2.0	4.0	5.0	2.0	5.0	6.0	6.0
#4	2.0	6.0	5.0	1.0	6.0	8.0	6.0
#5	3.0	5.0	5.0	2.0	6.0	5.0	6.0

Hole #2

Surface Finish, AA 90-95
Protrusion, in. .170
Perpendicularity, .001 in./in.
Longitudinal .0010 Transverse .0000
Flush Gage Reading, in. -.001
Capacitance Gage Reading 273
Exit Burr Height, in.

Bluing Pin Rollout

.316
.324

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	—	—	—	—	—	—	—
#2	1.0	0	0	0	2.0	3.0	2.0
#3	3.0	3.0	5.0	2.0	5.0	6.0	5.0
#4	4.0	4.0	5.0	0	6.0	7.0	6.0
#5	4.0	4.0	5.0	2.0	5.0	6.0	5.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 23 Quality Variable SURF. RGH. MID. INT. OVALITY
Specimen No. 3C3TC & 433TC

Hole Manufacturing Conditions and Procedures: REAM UNDERSIZE REAMER 1.755 DP., REAM MOD L.H. SPIRAL REAMER, USE STR. FLUTE REAMER PLUNGE 1.700 +/- .006 IN TRANSVERSE POS.

Spindle, rpm 80 Feed: 33 BIPM
Cutting Fluid: DRY Depth: (Ind. Reading) 2.400

Hole #1

Surface Finish, AA 95-100
Protrusion, in. .175
Perpendicularity, .001 in./in.
Longitudinal .0000 Transverse .0005
Flush Gage Reading, in. .0000
Capacitance Gage Reading 268
Exit Burr Height, in. ______

Bluing Pin Rollout

$\frac{.324}{.317}$

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	—	—	—	—	—	-15.0	—
#2	1.0	3.0	3.0	1.0	2.0	3.0	5.0
#3	4.0	6.0	6.0	3.0	6.0	6.0	7.0
#4	5.0	7.0	8.0	4.0	6.0	8.0	5.0
#5	4.0	6.0	6.0	4.0	5.0	6.0	9.0

Hole #2

Surface Finish, AA 95-100
Protrusion, in. .177
Perpendicularity, .001 in./in.
Longitudinal .0000 Transverse .0015
Flush Gage Reading, in. .0000
Capacitance Gage Reading 294
Exit Burr Height, in. ______

Bluing Pin Rollout

$\frac{.323}{.318}$

Air Gage Readings (.0001 in.)
Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	—	—	—	—	—	—	—
#2	1.0	2.0	3.0	0	1.0	3.0	2.0
#3	3.0	5.0	6.0	2.0	5.0	6.0	6.0
#4	3.0	5.0	8.0	4.0	5.0	8.0	7.0
#5	3.0	6.0	6.0	3.0	5.0	5.0	5.0

MANUFACTURING REPORT: TAPERED HOLES

Test Series 23 Quality Variable SURF. RGH. MID INT. OVALITY
Specimen No. 6D2BL4DITC

Hole Manufacturing Conditions and Procedures: REAM UNDERSIZE REAMER 1.755, REAM MOD L.H. SPIRAL REAMER, USE STR. FLUTE REAMER PLUNGE 1.700 ± .006 IN TRANSVERSE POS.

Spindle, rpm 80 Feed: 5.5 8 IPM
Cutting Fluid: DRY Depth: (Ind. Reading) 2.390

Hole #1

Surface Finish, AA 90-95
Protrusion, in. .180
Perpendicularity, .001 in./in.
Longitudinal .0000 Transverse .0010
Flush Gage Reading, in. .0000
Capacitance Gage Reading 280
Exit Burr Height, in.

Bluing Pin Rollout

.322/.318

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	—	—	—	—	—	-15.0	—
#2	1.0	2.0	3.0	1.0	3.0	3.0	3.0
#3	4.0	6.0	6.0	3.0	6.0	7.0	7.0
#4	4.0	7.0	8.0	4.0	8.0	8.0	5.0
#5	5.0	6.0	6.0	4.0	6.0	7.0	8.0

Hole #2

Surface Finish, AA 95-100
Protrusion, in. .180
Perpendicularity, .001 in./in.
Longitudinal .0000 Transverse .0005
Flush Gage Reading, in. .0000
Capacitance Gage Reading 281
Exit Burr Height, in.

Bluing Pin Rollout

.331/.324

Air Gage Readings (.0001 in.)

Angular Position

Axial Position	0°	45°	90°	180°	225°	270°	315°
Bottom #1	—	—	—	-14.0	—	—	—
#2	0	0	2.0	1.0	1.0	3.0	1.0
#3	1.0	3.0	5.0	2.0	4.0	6.0	5.0
#4	0	4.0	6.0	3.0	5.0	8.0	5.0
#5	3.0	4.0	5.0	3.0	5.0	5.0	6.0

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